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ABSTRACT

This compilation of labor force, occupational, and training program statistics is based on estimates of 1976 employment and projections for 1985. The projections of economic and employment data and information on occupational training may be used to plan education and training programs and to provide vocational guidance. Major sections of the bulletin are (1) occupational projections; (2) occupational training data (including vocational education, apprenticeship programs, military and federal training, two-year and community college programs, and college and university programs); (3) relating training to occupational needs (in this largest section, data are broken down by major occupational classes); and (4) tabulated, detailed occupational projections and training statistics. (CP)

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Occupational Projections and Training Data

U.S. Department of Labor
Ray Marshall, Secretary

Bureau of Labor Statistics
Janet L. Norwood,
Acting Commissioner
April 1979

Bulletin 2020

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Preface

Projections of occupational employment and information on occupational training are needed to plan education and training programs and provide vocational guidance. This bulletin presents both general and detailed information on the relationship between occupational requirements and training needs. It is a revision and updating of Bulletin 1918 of the same title published in 1976, and was prepared as part of the Bureau of Labor Statistics (BLS) program for developing and disseminating projections of economic and employment data. The BLS revises its projections every 2 years. During the next revision, projections will be developed for 1990. A projection of the labor force will be available in late 1978 and occupational projections will be developed in 1979.

This bulletin was prepared in the Division of Occupational Outlook under the general direction of Neal H. Rosenthal. Susan C. Gentz supervised its preparation. The data and information presented were collected, analyzed, and prepared by H. James Neary and John P. Griffin. Daniel E. Hecker contributed the discussion of job prospects for college graduates. The employment projections and the information on training required for entry to individual occupations represent the work of economists who prepared the 1978-79 edition of the *Occupational Outlook Handbook.*

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Chapter 1. Introduction

Each year occupational training is sought by millions of young people, the disadvantaged, and the hard-core unemployed to qualify for entry level jobs, and by thousands of experienced workers who wish to improve their job skills or acquire new skills for new careers. Many of these individuals attend vocational schools, enroll in home study courses, enter apprenticeship programs, or pursue college degrees. Others join the Armed Forces or seek training through a federally funded program such as the Job Corps. In addition, many more persons receive training on the job.

What role do these training programs play in preparing people for work? How many persons enter a given program each year? How many complete it? Does a specific training program meet employers' needs today? Will it meet their needs tomorrow? Are enough workers currently being trained for a particular occupation? Will programs need to be expanded or cut back in the future? The answers to these and other questions affect the decisions that will be made by educators, employers, training specialists, and economic policymakers. They also may influence the decisions that individuals make when determining their own career plans.

Through its occupational outlook program, the Bureau of Labor Statistics (BLS) conducts research in, and produces information on, future occupational and industrial employment requirements and resources. The results of this research appear in publications, such as the *Occupational Outlook Handbook*, that are designed for use in vocational guidance, and in special bulletins and reports oriented more towards the needs of training specialists and government policymakers. Much of the data and information assembled or developed by the BLS as part of its research effort is pertinent to the issues raised above. This bulletin provides, in summary form, the information believed to be useful to all concerned with occupational training.

Chapter 2 presents a general discussion of the Bureau's projections for major occupational groups. Estimates of 1976 employment and 1985 projections are presented, as are data on job openings resulting from growth and from deaths and retirements. Similar information for detailed occupations is provided in tabular form in appendix table B-1.

Estimates of future occupational openings constitute only part of the information needed for analyzing occupational training needs and job outlook. Information on the prospective supply of workers also is required. To determine the number of entrants to each occupation, data would be needed on (1) the number of persons completing training specifically designed to prepare them for work in that occupation, (2) the number completing related training, (3) the proportion of persons completing these two types of training who can be expected to seek entry to the occupation, (4) the number of persons who can be expected to transfer from other occupations, (5) the number of persons currently not in the labor force who are qualified for and can be expected to seek employment in the occupation, (6) unemployed persons who are qualified for the occupation and can be expected to seek reentry, and (7) the number of immigrants who are qualified.

Generally, much better data are available on entrants from specific training programs than from other sources. Chapter 3 provides general descriptions of current occupational training programs and highlights enrollment and completion data for each. It also contains a brief description of some of the problems involved in developing supply projections.[1]

Chapter 4 presents a comprehensive supply-demand analysis for college graduates as a whole. It also includes a supply-demand analysis for the few occupations where supply information is adequate for such an analysis. In addition, for each occupation covered in this publication, chapter 4 provides a brief discussion of the training required, projections of job openings due to growth and labor force separations, and available data on completions of related training programs.

The employment projections in chapter 4 reflect the national situation. Most vocational counseling and education and training planning, however, are done at the State and local levels. To meet the need for local data, the BLS, in cooperation with the Employment and Training Administration and State employment security agencies, conducts the Occupational Employment Statistics program. Under this program, occupational projections are prepared by State agencies using procedures developed by the BLS. During fiscal year 1978, projections were begun for the 1976-85 period for all States and for Standard Metropolitan Statistical Areas having a population of 50,000 or more. These projections will be consistent with those in this bulletin. Information on the availability of data for individual States can be obtained from the State agencies listed in appendix D.

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[1] A detailed discussion of occupational supply is presented in *Occupational Supply: Concepts and Sources of Data for Manpower Analysis*, Bulletin 1816 (Bureau of Labor Statistics, 1974).

The limitations of the data on occupational demand and supply must be taken into account when they are used for vocational guidance or for planning education and training programs. Since the future cannot be predicted with certainty, many assumptions must be made in preparing projections. (The broad assumptions on which projections in this bulletin are based are listed in appendix A.) The projections incorporate many judgments concerning the effects of new technology, legislation, and other factors. For example, to project employment of keypunch operators, a judgment must be made concerning the rate of introduction of new data-entry equipment. In addition, information required for analysis often is unavailable or incomplete. For example, data on completions of CETA or employer training programs, other than registered apprenticeships, are not available on a national basis, as discussed in chapter 3.

A major limitation is the lack of information on transfers among occupations. Because the transfer of workers among occupations is a source of both job openings and new entrants to specific occupations, information on mobility is critical to estimating future needs for new workers. A discussion of the work the BLS has done in this area appears in chapter 2.

Readers who desire more information on occupational training than this summary bulletin can provide may wish to consult the bibliography in appendix E for other sources. The bibliography also lists sources of information on earnings and other data related to occupations that users of this bulletin may find helpful.

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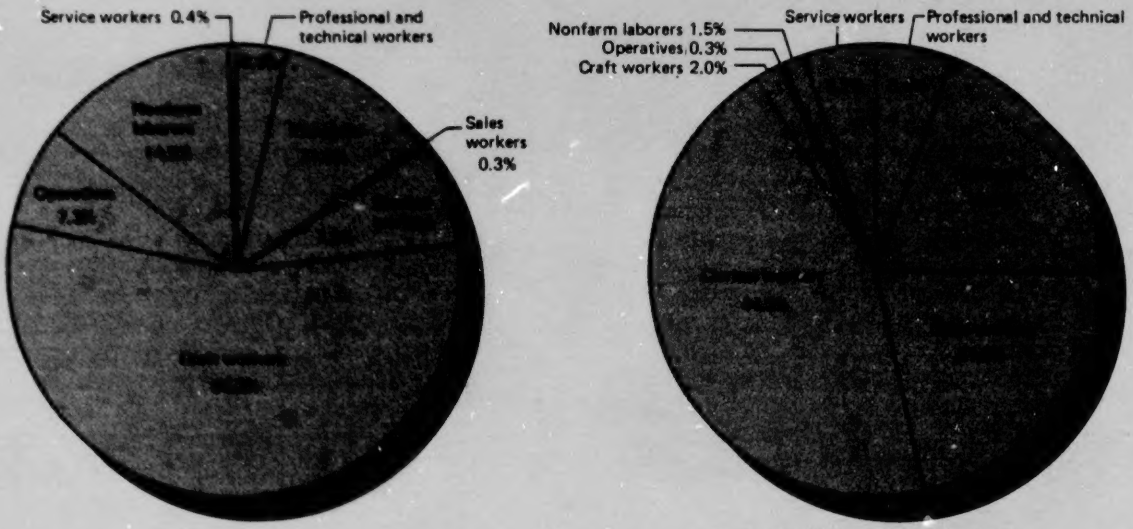
Chapter 2. Occupational Projections

Many factors interact in the economy to change employment levels in occupations. A key factor is change in employment among industries, which is a function of the demand for different products and services and changing technology. Generally, a rise in demand causes a rise in employment, and a drop in demand, a decline. The effects of technological innovation may be limited to only one industry or may be widespread. In the past, the development of new products and processes both created some industries and eliminated others.

Precisely what effect changes in industry employment will have on a particular occupation depends on the occupational structure of the industries involved. As shown in chart 1, industries differ greatly in the types of workers they employ. In 1976, craft workers constituted about 55 percent of the work force of the construction industry, for example, but only 2 percent of employment in the finance, insurance. and real estate industry. Should the demand for new houses and office buildings rise, the number of craft workers needed in construction would rise also. In contrast, even if the demand for financial and insurance services skyrocketed, the impact on craft workers would be small. Also, because the construction industry is the larger of the two, an increase in demand would have a larger impact even on occupations which constitute a similar proportion of employment in both industries, such as professional and technical workers.

A second factor affecting occupational employment is business organizational structure. The ways in which establishments are organized and operated have changed significantly in recent years, and have affected the demand for workers in many occupations. As more stores, restaurants, motels, and other enterprises have become chain operations, the number of salaried managers has grown,

Chart 1. Construction and finance, insurance, and real estate industries differ substantially in the kinds of workers they employ.



Construction

Finance, insurance, and real estate

Source: Bureau of Labor Statistics.

while the number of self-employed managers has declined. The trend toward self-service has slowed the growth of employment of retail clerks and gas station attendants.

Finally, supply-demand conditions in one occupation affect the demand for another. When workers in a highly skilled or professional occupation are in short supply, employers may hire more assistants or technicians. In hospitals, for example, nursing aides have performed some of the duties of registered nurses when registered nurses have been in short supply.

This chapter presents the BLS projections for major occupational groups through the mid-1980's. Information on the general methodology and assumptions used by the Bureau in developing its employment projections is provided in appendix A. Projections for individual occupations are presented in appendix B. A detailed discussion of the development of projections for the aggregate economy appears in the March 1976 issue of the *Monthly Labor Review*.

Occupational profile

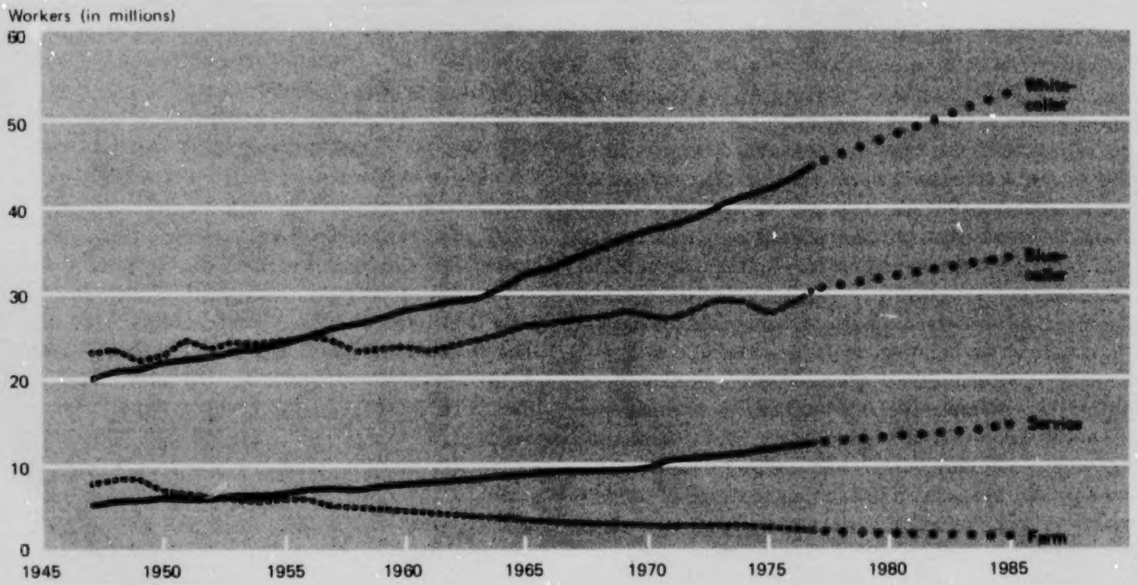
Customarily, occupations are divided into four groups: (1) White-collar workers—in professional and technical clerical, sales, and managerial jobs; (2) blue-collar workers—in craft, operative, and laboring jobs; (3) service workers and (4) farm workers. Growth rates among these groups have differed markedly, as shown in chart 2. Once a small proportion of the total labor force, white-collar workers now represent about half of the total. Service workers also have risen rapidly, while blue-collar workers have grown at a slower rate and farm workers have declined. The following sections describe expected changes among the broad occupational groups between 1976 and 1985.

Professional and technical workers include a wide range of workers, many of whom are highly trained. Among this group are scientists and engineers, medical practitioners, teachers, entertainers, and accountants. Employment in this group is expected to rise from 13.3 to 15.8 million workers, or about 18 percent, between 1976 and 1985, slightly less than the rate of growth expected for total employment. Thus, the share of total employment attributable to professional and technical workers will remain about the same during the 1976-85 period (table 1).

Greater efforts in energy production, transportation, and environmental protection will contribute to a growing demand for scientists, engineers, and technicians. The medical professions can be expected to grow as the health service industry expands. The demand for professional workers to develop and utilize computer resources also is projected to grow rapidly.

Some occupations will offer less favorable job prospects, in many cases because the supply of workers exceeds available openings. Teachers will continue to face competition, as will artists, entertainers, and oceanographers.

Chart 2. The shift toward white-collar occupations will continue through 1985.



Note: 14- and 15- year-olds are included prior to 1958.
Source: Bureau of Labor Statistics

Table 1. Employment by major occupational group, 1976 and projected 1985

[Numbers in thousands]

Occupational group	1976 employment		Projected 1985 employment		Percent change, 1976-85
	Number	Percent	Number	Percent	
Total	87,485	100.0	104,300	100.0	19.2
White-collar workers	43,700	49.9	53,500	51.3	22.4
Professional and technical workers	13,329	15.2	15,800	15.1	18.2
Managers and administrators	9,315	10.6	11,300	10.8	21.0
Sales workers	5,497	6.3	6,400	6.1	16.6
Clerical workers	15,558	17.8	20,000	19.2	28.8
Blue-collar workers	28,958	33.1	34,100	32.7	17.9
Craft and kindred workers	11,278	12.9	13,700	13.2	21.6
Operatives	13,356	15.2	15,600	15.0	16.9
Nonfarm laborers	4,325	4.9	4,800	4.6	11.3
Service workers	12,005	13.7	14,800	14.2	23.4
Private household workers	1,125	1.3	900	.9	- 18.8
Other service workers	10,880	12.4	13,900	13.3	27.7
Farm workers	2,822	3.2	1,900	1.8	-34.1

NOTE: Detail may not add to totals because of rounding

Managers and administrators include workers such as corporate executives, school and hospital administrators, department store managers, and self-employed business operators. This group is expected to increase from 9.3 to 11.3 million workers, or 21 percent. This rate of growth is slightly faster than that anticipated for total employment, but the share of total employment attributable to managers and administrators should change only slightly, from 10.6 to 10.8 percent in 1985.

Changes in business size and organization have resulted in differing trends for self-employed and salaried managers. The number of self-employed managers will continue to decline as many areas of business are increasingly dominated by large corporations and chain operations. Supermarkets, corporately owned restaurants, and fast food chains, to cite examples, will continue to restrict opportunities for the self-employed. Requirements for salaried managers, on the other hand, will grow as management specialists increasingly operate corporate-owned establishments and more technically trained managers administer research and development programs. Some small retail trade and business services establishments still will provide opportunities for self-employment, however. Rapidly expanding service industries are expected to offer more jobs for managers than manufacturing industries, which will grow more slowly.

Clerical workers make up both the largest and fastest growing occupational group. Clerical employment is projected to rise from 15.6 to 20.0 million between 1976 and 1985, or about 29 percent. The clerical share of total employment will increase from 17.8 to 19.2 percent during this period.

New developments in computers, office machines, and dictation equipment will affect employment in various occupations within this group. For example, the more extensive use of computers to store information and for billing, payroll, and other clerical calculations will limit employment opportunities for file clerks and office machine operators while at the same time the need for computer and peripheral equipment operators will increase. Dictation machines will continue to adversely affect stenographers who are not trained as court reporters. Technological innovations will not affect many types of clerical workers whose jobs involve a high degree of personal contact. Substantial growth is anticipated for secretaries, typists, and receptionists as business services and medical and health care services expand.

Sales workers are employed primarily in retail stores, manufacturing and wholesale firms, insurance companies, and real estate agencies. Employment of this group is expected to increase from 5.5 to 6.4 million workers, or 17 percent, a slower rate than for total employment. As a result, the proportion of sales workers to total employed will decrease from 6.3 to 6.1 percent.

Much of the increase in the number of sales workers will result from expansion in the retail trade industry, which employs about one-half of these workers. The demand for both full- and part-time sales workers in retail trade will increase because a growing population creates demand for more shopping centers and stores. Despite the widespread use of laborsaving merchandising techniques, such as self-service and computerized checkout procedures, suburban expansion and longer operating hours will cause employment to increase.

Craft and kindred workers. Craft workers include a wide variety of highly skilled workers, such as automobile mechanics, carpenters, electricians, machinists, and tool-and-die makers. Craft worker employment is expected to increase from 11.3 to 13.7 million during the 1976-85 period, or about 22 percent. The craft share of total employment will increase slightly, from 12.9 to 13.2 percent.

Construction occupations and mechanics and repairers, the two largest occupational categories within the craft group, are expected to account for about two-thirds of the group's employment gain, and blue-collar supervisors and metalcraft workers for most of the remainder.

Nearly all construction trades are expected to grow, particularly cement masons, plumbers, structural metal workers, roofers, and heavy equipment operators. The most rapid increases will be for mechanics and repairers who install, maintain, or repair computers, office machines, air conditioners, and radio and television sets.

In contrast, the long-run employment decline in the railroad industry will lead to the decline of some craft occupations concentrated in that industry, such as railroad and car shop repairers. Similarly, very little growth is anticipated in printing craft occupations because of advances in printing technology.

Operatives, the largest blue-collar group, include workers such as assemblers, packers, truck and bus drivers, and many types of machine operators. Employment of operatives is tied closely to the production of goods, because the majority of these workers are employed in manufacturing industries. The projected slow growth of manufacturing, along with improved production processes, will hold down the demand for these workers. Textile operatives, such as spinners, knitters, and weavers, are expected to decline as the textile industry uses more machinery.

Outside of manufacturing, employment of most transportation operatives, such as truckdrivers, route drivers, and busdrivers will increase as the transportation industry grows. Employment of brake and switch operators, however, is expected to decline along with the decline of the railroad industry.

Employment of operatives is expected to increase from 13.4 to 15.6 million between 1976 and 1985, or about 17 percent. The operative share of total employment is expected to decline slightly, from 15.2 to 15.0 percent.

Laborers (except farm) include workers such as garbage collectors, construction laborers, freight and stock handlers, and vehicle washers and equipment cleaners. Employment in this group is expected to grow only slowly as machinery increasingly replaces manual labor in construction and manufacturing, the two largest industries employing these workers. For example, power-driven equipment will handle more and more materials in factories, warehouses, and on construction sites, and more plants will install integrated systems to process and convey materials and equipment. Between 1976 and 1985, employment of laborers is expected to rise from 4.3 to 4.8 million, or about 11 percent. The proportion of total employment made up of laborers will decline slightly, from 4.9 to 4.6 percent.

Service workers include a wide range of workers—firefighters, janitors, cosmetologists, private household workers, and bartenders are a few examples. These workers, mostly employed in service-producing industries, make up one of the fastest growing occupational groups. Factors expected to increase the need for these workers are the increasing demand for medical care; the greater need for protective and cleaning services; and the more frequent use of restaurants, beauty salons, and leisure services as incomes rise. Employment of private household workers, however, will continue to decline despite a rising demand for their services because low wages and the strenuous nature of the work make this occupation unattractive to many people.

Between 1976, and 1985, employment of service workers is expected to increase from 12.0 to 14.8 million workers, or 23 percent. In contrast, private household workers are projected to decline from 1.1 million to 900,000, or nearly 20 percent.

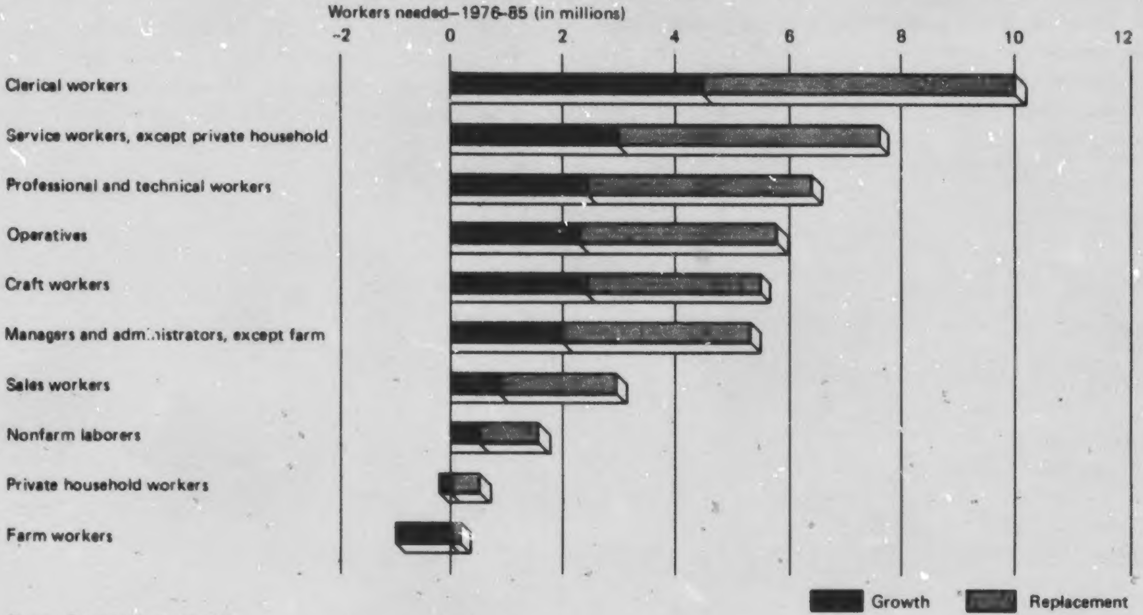
Table 2. Projected employment and job openings, by major occupational group, 1976-85

[Numbers in thousands]

Occupational group	1976 employment	Projected 1985 employment	Percent change	Openings, 1976-85		
				Total	Growth	Replacements
Total	87,485	104,300	19.2	45,900	16,800	29,100
White-collar workers	43,700	53,500	22.4	24,800	9,800	15,000
Professional and technical workers	13,329	15,800	18.2	6,400	2,400	3,900
Managers and administrators	9,315	11,300	21.0	5,400	2,000	3,400
Sales workers	5,497	6,400	16.6	3,000	900	2,100
Clerical workers	15,558	20,000	28.8	10,000	4,500	5,500
Blue-collar workers	28,958	34,100	17.9	12,800	5,200	7,700
Craft and kindred workers	11,278	13,700	21.6	5,500	2,400	3,100
Operatives	13,356	15,600	16.9	5,800	2,300	3,500
Nonfarm laborers	4,325	4,800	11.3	1,600	500	1,100
Service workers	12,005	14,800	23.4	8,100	2,800	5,300
Private household workers	1,125	900	-18.8	500	-200	700
Other service workers	10,880	13,900	27.7	7,600	3,000	4,600
Farm workers	2,822	1,900	-34.1	200	-1,000	1,200

NOTE: Detail may not add to totals because of rounding.

Chart 3. Job openings are determined by replacement plus growth.



Source: Bureau of Labor Statistics

Farm workers include farmers, farm operators, and farm laborers. Employment on the farm has declined for decades as the trend to fewer but larger farms, the use of more and better machinery, and the development of new feeds, fertilizers, and pesticides have increased farm productivity. Developments in picking, packing, inspecting, and sorting systems for fruits, vegetables, and other agricultural products also are expected to reduce labor requirements in the future. Employment of farm workers is expected to decline from 2.8 to 1.9 million between 1976 and 1985, or slightly more than one-third.

Job openings, 1976-85

Employment growth represents only part of the demand for workers in an occupation. The need to replace workers who die or retire is expected to produce almost twice as many openings as employment growth. As illustrated in chart 3, replacements will be a more significant source of job openings in every major occupational group and also in many individual occupations. Table 2 presents 1976 employment data, projected 1985 employment, and expected job openings through 1985, by major occupational group.

Because the transfer of workers among occupations is a source of both job openings and new entrants to specific occupations, information on transfers is critical to estimating future needs for new workers. Data from occupational mobility studies also can provide qualitative information about opportunities for jobseekers. If most new entrants to an occupation are transfers and older workers, the occupation is not likely to present good opportunities for young workers. By contrast, the data may identify occupations where entrants are mostly new entrants to the labor force. Such occupations are likely to provide entry-level jobs for young workers.

Because of its complexity, occupational mobility has been one of the more difficult types of labor force behavior to quantify. Its measurement requires (1) a longitudinal data source to identify labor force status and occupation of individuals at two points in time and (2) a large sample to provide reliable information by age and sex for relatively detailed occupational categories.

Data collected in the 1970 Census of Population provide a unique opportunity for analysis of occupational mobility because they give not only current labor force status and occupation, but also work status and occupation in April 1965. The resulting data base, though not without limitations, is the most comprehensive one available to measure changes in work status and occupation over a specific time period.

An analysis of occupational demand and supply developed by the BLS from Census data indicates that between 1965 and 1970 about one-third of all workers moved to a different detailed occupational category, creating three openings in the occupations they left for every two created by workers who died or left the labor force. Transfers also were a substantial proportion of entrants to occupations, outnumbering new labor force entrants by 3 to 2. Because of the magnitude of the movement of workers, the exclusion of occupational transfers from estimates of job openings and entrants is a serious limitation. A detailed discussion of the Bureau's analysis of the census data appears in the January 1977 *Monthly Labor Review.* [3]

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[3] Dixie Sommers and Alan Eck, "Occupational Mobility in the American Labor Force," *Monthly Labor Review*, Jan. 1977, pp. 3-19.

Chapter 3. Occupational Training

The potential supply of workers for any occupation consists of persons currently employed in that field, plus individuals from other sources. They may be graduates of programs specifically designed to train workers for the occupation, or graduates of training programs for related fields. They may be persons who possess the necessary qualifications but who are employed in other occupations, unemployed, or not in the labor force. They also may be persons who will immigrate.

To determine supply, one must know not only the number of persons who would fall in each category, but also the proportion who actually will seek jobs in the occupation. In general, far more data are available on the number completing formal training programs than on any other component of supply.[1]

The supply of physicians, for example, can be gauged with some confidence. Entry is limited to graduates of U.S. medical schools and qualified immigrants, and virtually all graduates and qualified immigrants become physicians. Therefore, only projections of medical school graduates plus projections of qualified immigrants are needed to specify supply. Good data are available on medical degrees granted in the past, and M.D. degrees are projected through fairly reliable methods. Good historical data on immigrant physicians also are available on which to base projections.

There are several other occupations for which sufficient data are available to specify future supply, but the estimates must be used cautiously because some of the components of supply are difficult to project. For example, in engineering, the primary source of supply is new graduates of engineering schools and historical data on degrees granted are available on which to base degree projections. Sufficient data also are available to develop estimates of the proportion of new graduates who can be expected to enter engineering. In the past, however, a large number of workers also have entered engineering from other sources, including new college graduates with degrees in related fields such as mathematics and the physical sciences, transfers from other occupations, and immigrants. Prospective supply from these sources can be projected based on past trends, but because the number of entrants depends on the relative wages among related occupations and the availability of jobs in engineering versus related fields, accurately estimating this component of supply is very difficult.

For many other occupations that require formal training, adequate analyses of supply are impossible since only limited data on training completions and entry rates are available. Usually, these occupations can be filled by workers from many different training programs, and a significant portion of training takes place on the job. Among this group are many professional and administrative fields, such as marketing and personnel work, and most skilled craft occupations, such as carpenters and television and radio repairers.

Finally, there are many occupations for which comprehensive supply analyses are meaningless because, in comparison to the number of job openings available, many workers possess entry level skills. Examples of these occupations are receptionist, retail clerk, and assembler.

This chapter presents information on one component of supply—structured training programs. It describes current programs and highlights enrollment and completion data for each. Detailed estimates are presented in appendix C. Training programs discussed are:

Public vocational education
Private vocational education
Employer training
Apprenticeship programs
Federal employment and training programs
Armed Forces training
Home study schools
Community and junior colleges
Colleges and universities

Public vocational education

Vocational education in the public schools originated with the Smith-Hughes Act of 1917. Subsequent legislation included the George-Barden Act (1941), which called for expanded occupational training and increased expenditures for vocational education; the Vocational Education Act of 1963, which provided for research and construction for the first time; and the Vocational Education Amendments of 1968, which added new programs and money while changing the philosophical emphasis of vocational education to focus on the needs of individuals rather than on specific occupational areas. The 1963 law and its 1968 amendments not only provided for increased enrollments and expenditures but improved the quality and expanded the scope of vocational programs. Further amendments in 1976 set up improved data collection systems for vocational education.

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[1] A detailed discussion of occupational supply is presented in *Occupational Supply*, BLS Bulletin 1816.

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Vocational education is conducted on three levels—secondary, postsecondary, and adult vocational and technical programs. Secondary vocational education is provided to high school students as part of the curriculum and includes academic as well as vocational courses. Postsecondary vocational education is intended for persons who have completed or left high school and includes those who are enrolled in programs leading to an associate or other degree below the baccalaureate. Adult vocational and technical programs retrain as well as update and improve skills of persons already in the labor force.

Types of training available. Originally, vocational education emphasized agricultural and trade and industrial education. At present it also includes areas such as distribution, health, home economics, and office and technical occupations. Other programs that are offered, such as consumer and homemaking training and industrial arts, do not lead directly to an occupational skill. Special vocational programs for the disadvantaged and handicapped also are provided.

Curriculums generally prepare trainees for specific occupations. Table 3 records examples of instructional programs related to job titles in the *Dictionary of Occupational Titles.*

Enrollments. Vocational education grew rapidly after the Vocational Education Act of 1963, and further growth took place after passage of the 1968 amendments (table 4). Enrollments in federally aided vocational-technical education programs in 1976 totaled 15.1 million persons, including 1.9 million disadvantaged and nearly 285,000 handicapped. Of the major vocational areas leading to an occupational skill, the largest enrollments were in the office and the trades and industry groups, which enrolled 3.1 million each (table 5). Programs with the largest enrollments in 1976 were: Stenography, secretarial, and related skills (700,000); typing and related skills (656,000); filing and office machines (593,000); agricultural production (575,000); and accounting and computing (512,000).

Completions and placements. Of the nearly 2,150,000 persons completing programs during 1976, about 1,184,000 or 55 percent were available for employment. Followup studies of graduates indicate that of those available for employment or placement, 64.4 percent were employed full time in the field in which they trained or in a related field, 25.3 percent obtained other employment, and 10.3 percent were unemployed. Of the remaining 966,000 completing programs, about 25 percent were not available for placement (many continued their schooling), and 20 percent did not report or their status was unknown.[4]

Private vocational education

In the 1975-76 academic year, there were about 7,500 private vocational schools, according to the National Center for Education Statistics (table 6). The largest enrollments were in business/office schools, cosmetology/barber schools, vocational/technical schools, and trade schools.

About two-thirds of the 7,500 private vocational schools enrolled fewer than 100 students in about 175 different program areas. Some business schools offer shorthand, typing, stenography, and fundamentals of accounting and computing operations, while others offer only a specialized area. Trade schools offer many diverse courses, from air conditioning installation and repair to welding and cutting operations. Programs in other types of vocational and technical schools also cover a broad range, including dental assisting, commercial pilot training, and fashion designing.

Table 3. Examples of curriculums offering training for specific occupations

Major vocational area	Instructional program	Occupational title
Agriculture	Agricultural mechanics	Farm equipment mechanic
	Soil	Soil conservationist
	Forestry	Forest aid
Distribution	Floristry	Floral designer
	Distributive services	Purchasing agent
	Recreation and tourism	Recreation director
Health	Dental assistant	Dental assistant
	Medical lab assisting	Medical lab assistant
	Occupational therapy	Occupational therapy aide
Home economics	Care and guidance of children	Child care attendant
	Food management, production, and services	Cook
Office	Peripheral equipment operator	High-speed printer operator
	Secretaries	Legal secretary
	Quality control clerk	Claim examiner
Technical	Commercial pilot training	Commercial airplane pilot
	Electronic technology	Electrical technician
	Scientific data processing	Programmer, engineering and scientific
Trades and industry	Body and fender repair	Automobile body repairer
	Aircraft operation	Flight engineer
	Product design	Industrial designer

SOURCE: *Vocational Education and Occupations,* OE80061 (U.S. Department of Health, Education, and Welfare, Office of Education; and U.S. Department of Labor, Manpower Administration), July 1969.

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[4] *Summary Data, Vocational Education, Fiscal Year 1976* (U.S. Department of Health, Education, and Welfare, Office of Education Bureau of Occupational and Adult Education, January 1978.)

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As an indication of the popularity of certain vocational education programs and the extent to which they were offered during 1975-76, nearly one-third of the 175 program offerings were in the eight fields shown below:

Program	*Number offered*
Cosmetology	2,290
Commercial pilot	1,292
Nursing (all types)	1,142
Secretary	992
Auto mechanic (all types)	736
Accounting/bookkeeping	662
Radiologic technology	609
Data processing	567

Enrollments. Private vocational education courses are classified, for analytic purposes, into seven areas similar to those used for public vocational education programs: Agribusiness, distribution, health, home economics, office, technical, and trades and industry. In 1975-76, slightly more than 30 percent of all students in private vocational education were in trades and industry programs, another 30 percent were in office training, and about 14 percent were in technical occupation programs (table 7).

Private vocational education programs with the largest enrollments during the 1975-76 school year were: Cosmetology (89,100) and stenography, secretarial, and related occupations (79,700). (See appendix table C-8 for further detail.)

Completions. The ratio of completions to enrollments varies considerably among programs. Several programs, for example, cosmetology, commercial pilot training, truck driving, and mortuary science, generally record far more than one-half of enrollees completing the program. Some programs graduate as few as one-sixth of enrollees, but these are in the minority. Detail on job placements for students completing private vocational education programs is not available.

Table 4. Enrollments in public vocational education, by level, fiscal years 1963-76

Fiscal year	Total[1]	Secondary	Post-secondary	Adult
1963	4,217,198	1,950,016	144,060	2,123,122
1964	4,566,390	2,140,756	170,835	2,254,799
1965	[2] 5,430,611	2,819,250	207,201	2,378,522
1966	[2] 6,070,059	3,048,248	442,097	2,530,712
1967	[2] 7,047,501	3,532,823	499,906	2,941,109
1968	[2] 7,533,936	3,842,896	592,970	2,987,070
1969	[2] 7,979,366	4,079,395	706,085	3,050,466
1970	8,793,960	5,114,451	1,013,426	2,666,083
1971	10,495,411	6,494,641	1,140,943	2,859,827
1972	11,602,144	7,231,648	1,304,092	3,066,404
1973	12,072,445	7,353,982	1,349,731	3,368,752
1974	13,555,639	8,433,750	1,572,779	3,549,110
1975	15,340,426	9,426,376	1,889,946	4,024,104
1976	15,133,322	8,860,947	2,202,800	4,069,575

[1] Unduplicated total.

[2] Includes enrollments in special needs programs as follows: 1965, 25,638; 1966, 49,002; 1967, 73,663; 1968, 111,000; 1969, 143,420.

SOURCE: *Summary Data, Vocational Education, Fiscal Years 1963-76* (U.S. Department of Health, Education, and Welfare, Office of Education, Bureau of Occupational and Adult Education).

Table 5. Enrollments in public vocational education, by major vocational education area, fiscal year 1976

Vocational education area	Number	Percent distribution
Total[1]	15,133,322	100.0
Agri-business	1,059,717	7.0
Distribution	900,604	6.0
Health	684,904	4.5
Home economics	471,289	3.1
Office	3,114,692	20.6
Technical	484,807	3.2
Trades and industry	3,109,950	20.6
Consumer and homemaking	3,515,042	23.2
Special programs[2]	2,004,858	13.2

[1] Unduplicated total.

[2] Includes prevocational, prepostsecondary, remedial, industrial arts, volunteer firefighters, and other programs not elsewhere classified.

SOURCE: U.S. Department of Health, Education, and Welfare, Office of Education, Bureau of Occupational and Adult Education.

Employer training

Many companies in private industry have developed educational training programs to meet their various business needs. Generally these programs serve three purposes: (1) To train new employees, (2) to improve the performance of employees in their present jobs, and (3) to prepare employees for new jobs and responsibilities.

Training varies among occupations. Skilled and semiskilled occupations have three on-the-job training paths—apprenticeship, structured on-the-job instruction, and learning by doing. Structured instruction may range from scheduled training conducted by designated instructors to periodic training from supervisors and fellow employees. Unstructured training often involves simple directions on how to perform a routine task on a machine; further skills then are acquired or developed at the employee's initiative.

White-collar employees also may receive structured training. In larger companies, structured training usually consists of "in-house" programs that offer courses either during or after working hours. These courses normally are designed to meet specific company needs.

In addition, companies may allow employees to enroll in college or university courses. For example, under the tuition-aid program, employees may be partially or fully reimbursed for job-related courses taken after working

Table 6. Number of private postsecondary schools with occupational programs, and full- and part-time enrollments by type of school, 1975-76

Type of school	Number of schools	Enrollments (thousands)		
		Total	Full time	Part time
Total	7,509	930.7	669.9	238.9
Vocational/technical	603	127.7	62.2	41.3
Technical institute	172	50.6	37.0	13.7
Business/office	1,220	338.4	252.8	72.1
Cosmetology/barber	2,325	132.1	110.0	21.1
Flight	1,361	67.4	12.7	53.4
Trade	701	123.5	95.5	26.0
Hospital	897	61.3	60.8	.5
Other	230	29.7	18.9	10.8

SOURCE: U.S. Dep[illegible]ment of Health, Education, and Welfare National Center for Edu[illegible]ion Statistics.

hours. Occasionally, employees are permitted to take outside courses on company time or even to arrange for extended educational leaves of absence.

Limited data indicate that companies use education and training programs quite extensively. In a 1975 survey of firms with 500 or more employees, the Conference Board[5] found that of the 32 million employed, 4.3 million participated in "in-house" company programs and 1.25 million were in tuition-aid programs. Although firms with fewer than 500 employees often do not have the resources to develop "in-house" programs, tuition-aid programs are not uncommon among these companies.

The lack of data on employer training hinders detailed analysis of occupational training and supply, however. The BLS, with the support of the Employment and Training Administration, conducted a pilot survey in 1970 to test the feasibility of collecting data on occupational training in selected industries, and to determine the best method of collecting such data.[6] The results encouraged the Bureau, with further support from the Employment and Training Administration, to conduct a nationwide, full-scale mail survey of employer training in nearly 5,000 establishments in 1975 and early 1976. The resulting report, published in 1977, describes the characteristics of occupational training provided by employers for 14 selected occupations in four metalworking industries.[7]

Although narrow in scope, the study presents characteristics of training programs never before documented, along with enrollment and completion data. Some highlights from the BLS/ETA training survey follow:

1. Only 15 percent of all establishments in the four metalworking industries selected provided structured occupational training in the 14 occupations studied.
2. Establishments with 1,000 employees or more accounted for 44 percent of all enrollments in structured training.
3. About 71 percent of all structured training was conducted to qualify employees for work in an occupation whereas 29 percent was to improve current job skills.
4. More than two-thirds of all structured occupational training was provided on the job.
5. Establishments provided training primarily because they felt job skills could best be taught in their own training programs and because employees' education or training was inadequate.
6. Employee interest in an occupation was the primary factor used to select employees for training.

Apprenticeship programs

Training authorities generally recommend apprenticeship as the best way to acquire all-round proficiency in a craft. Most apprenticeships range from 1 to 5 years, depending upon the particular trade involved. The programs involve planned on-the-job training and experience, with instruction and required supervision, combined with technical studies in subjects related to the trade. Mastery of a particular trade requires: (1) Learning the skills of the trade; (2) perfecting the use of each specific skill; and (3)

Table 7. Enrollments and completions in private postsecondary schools with occupational programs, by program, 1975-76

[Numbers in thousands]

Program	Enrollments		Completions	
	Number	Percent	Number	Percent
Total	638.5	100.0	347.7	100.0
Agribusiness	2.5	.4	2.0	.6
Distribution	57.2	9.0	44.8	12.9
Health	94.0	14.7	48.6	14.0
Home economics	1.7	.3	.2	.1
Office	204.5	32.0	90.9	26.1
Technical	72.5	11.4	38.8	11.2
Trades and industry	206.1	32.3	122.4	35.2

NOTE: Detail may not add to totals because of rounding.

SOURCE: U.S. Department of Health, Education, and Welfare, National Center for Education Statistics.

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[5] Seymour Lusterman, *Education in Industry*, Report 719 (New York, The Conference Board, Inc., 1977).

[6] "The BLS Pilot Survey of Training in Industry," *Monthly Labor Review*, Feb. 1974, pp. 26-32.

[7] *Occupational Training in Selected Metalworking Industries: A Report on a Survey of Selected Occupations, 1974*, BLS Bull. 1976/ETA R&D Monograph 53, (U.S. Department of Labor, Bureau of Labor Statistics and Employment and Training Administration, 1977).

bringing each skill up to the speed and accuracy required of the job.

Many apprenticeship programs have committees of employers and local trade unions that interview applicants, review the apprentice's progress, and determine when apprenticeship has been completed satisfactorily. Many programs are registered with Federal or State apprenticeship agencies, but sponsors are not required to register their programs. No estimate is available of the number of apprentices in programs that are not registered.

The Department of Labor's Bureau of Apprenticeship and Training (BAT) registers, but does not finance, apprenticeship programs. BAT provides technical assistance and support to State apprenticeship agencies and to employers and unions in establishing and maintaining apprenticeship programs. In addition, BAT maintains records of new registrations, completions, and cancellations of apprenticeships for each apprenticeable trade by State.

Of the 49,447 registered apprenticeship completions in 1976, about 59 percent were in construction trades, 11 percent in metalworking, 3 percent in printing, and the remaining 28 percent in a miscellaneous trades category. (See appendix tables C-1 and C-4.) Although the steady growth of apprenticeship registrations which took place in the 1960's has not continued in the 1970's (table 8), apprenticeship training continues to be important to employers, unions, and government policy planners.

Although apprenticeship cancellations represent a potential loss of highly trained workers, many dropouts eventually become skilled craft workers through less structured means. In many instances, particularly when jobs are plentiful, apprentices drop their apprenticeship in favor of earning a skilled worker's wage immediately. When the job market is depressed, they are more likely to complete their apprenticeships.

Federal employment and training programs

The Federal Government has conducted structured employment and training programs since the enactment of the Manpower Development and Training Act (MDTA) of 1962. With the passage of the Comprehensive Employment and Training Act (CETA) of 1973, programs were decentralized. Although the Federal Government has retained a few programs, such as the Work Incentive (WIN) Program, most Federal employment and training funds now are distributed to State and local governments, along with the responsibility for planning and managing these programs.

Comprehensive Employment and Training Act. Under the Comprehensive Employment and Training Act, all States, cities, and counties, with populations of 100,000 or more receive Federal grants to run comprehensive employment and training programs in their localities. Some smaller units and rural areas also qualify for Federal allocations. In fiscal year 1977, about 446 eligible units called prime sponsors received funds to provide some of the services or to contract with others. The amount each prime sponsor receives is based upon its current population, unemployment rate, training needs, and number of economically disadvantaged persons.

To receive Federal funds, every eligible sponsor must submit a comprehensive plan describing its area, the services to be provided, and persons to be served. To the maximum extent feasible, employment and training services, including the development of job opportunities and placement in public service jobs, are provided for unemployed, underemployed, and economically disadvantaged persons.

Every State and area that operates a comprehensive employment development program must have a planning council whose members represent clients, labor, business, education, community organizations, the employment services, training agencies, and, where appropriate, agriculture. The councils help governments decide on the services needed and check on program operations.

In fiscal year 1977, CETA served about 2.5 million individuals, not counting nearly a million youth in subsidized summer jobs. About 22 percent received classroom training, 13 percent obtained on-the-job training, 35 percent were in public service employment, and 23 percent were provided work experience. The remaining 7 percent received a variety of services designed to improve their employability.

Unfortunately, under this decentralized system, national data such as completions are not available. However, State and local area data may be available from prime sponsors.

Work Incentive (WIN) Program. The Work Incentive (WIN) Program helps employable recipients of Aid to Families with Dependent Children (AFDC) get and keep jobs. WIN, created by 1967 amendments to the Social Security Act, was significantly changed by 1971 amendments. The revised program has been referred to as WIN II.

WIN, which is administered jointly by the Department of Labor and the Department of Health, Education, and Welfare through State employment services and welfare agencies, provides job development services and referrals and helps to find employment, subsidizes employment, and provides limited training and supportive services, as needed, to registrants.

After registrants are interviewed to determine their job potential and needs, an employability plan is started to identify services and activities they need to get jobs. WIN tries to place people in unsubsidized jobs. Of the 1,060,700 registrants during the 1977 fiscal year, about 272,000

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[8] *Apprentice Registration Actions, by Region and State* (annual) may be obtained from Division of Reporting Operations, Employment and Training Administration, U.S. Department of Labor, Washington, D.C. 20210. In addition, the annual *Employment and Training Report of the President* contains a tabulation of the training status of registered apprentices.

Table 8. Training status of registered apprentices in all trades, 1960-76

Year	In training at beginning of year	Apprentice actions during year: New registrations and reinstatements	Apprentice actions during year: Completions	Apprentice actions during year: Cancellations[1]	In training at end of year
1960	172,161	54,100	31,727	33,406	161,128
1961	161,128	49,482	28,457	26,414	155,649
1962	155,649	55,590	25,918	26,434	158,887
1963	158,887	57,204	26,029	26,744	163,318
1964	163,318	59,960	25,744	27,001	170,533
1965	170,533	68,507	24,917	30,168	183,955
1966	183,955	85,031	26,511	34,964	207,511
1967	207,511	97,396	37,299	47,957	220,151
1968	[2] 207,517	111,012	37,287	43,246	237,996
1969	237,996	123,163	39,646	47,561	273,952
1970	[2] 269,626	108,779	45,102	53,610	279,693
1971	[2] 278,451	78,535	42,071	43,104	274,024
1972	[2] 247,840	103,527	53,059	56,750	264,122
1973	[2] 243,956	133,258	43,580	49,860	283,774
1974	[2] 280,965	112,830	46,454	56,292	291,049
1975	[2] 284,562	83,018	45,765	55,338	266,477
1976	[2] 265,647	88,418	49,447	49,650	254,968

[1] Includes voluntary quits, layoffs, discharges, out-of-State transfers, upgrades within certain trades, and suspensions or interruptions for military service.

[2] Reflects changes or revisions in the reporting system from previous year.

SOURCE: U.S. Department of Labor, Bureau of Apprenticeship and Training.

were placed in unsubsidized jobs and more than 150,000 in work and training programs.

Job Corps. The Job Corps assists youth between 16 and 21 years of age, mostly school dropouts, who have poor educational records and who are "economically disadvantaged," to become more employable and productive. The program provides basic educational and vocational skills as well as social skills and counseling, medical, dental, and other support. The Job Corps differs from other Federal employment programs in that centers provide residential living 24 hours a day, 7 days a week. Centers vary in enrollment from 150 to 2,300 and serve men, women, or both; they may be urban or rural.

For the fiscal year ending June 30, 1976, about 64,100 corps members in 60 centers in 31 States and Puerto Rico received training. Among fields of training were clerical-sales, services, forestry-farming, food service, auto and machine repair, construction trades, electrical appliance repair, industrial production, transportation, and health occupations. Approximately 43,100 trainees left the program during the fiscal year, of whom about 23,400 were completers. During the same period approximately 18,400 completers were reported to be available for placement. About 12,350 (67 percent) obtained job placements; about 5,250 were placed in their field. Most of the remainder received school or military placement. Training completions in specific fields are recorded in appendix table C-1.

Armed Forces training

The Armed Forces are among the Nation's largest sources of trained workers. Of the five categories of military training programs—recruit, specialized skill, officer acquisition, professional development, and flight—the most important in numbers and influence is specialized skill training. It provides military personnel with skills for technical jobs such as radio communication and aircraft engine repair, and for administrative and service-related specialties such as clerical work and military police duty.

The impact of specialized skill training is clearly reflected by the occupational distribution of the Armed Forces. The number of enlisted personnel in each of the nine major occupational groups on September 30, 1977, was as follows:

Infantry, gun crews, and seamanship specialists	259,647
Electronic equipment repairers	164,162
Communications and intelligence specialists	148,977
Medical and dental specialists	78,690
Other technical and allied specialists	36,731
Functional support and administration	265,674
Electrical/mechanical equipment repairers	340,936
Craft workers	71,897
Service and supply handlers	161,606

This tabulation shows that the skills of enlisted personnel are concentrated in the mechanical and technical areas. Thus, the military services are potentially a major source of trained civilian workers in these fields. (See appendix table C-6 for further detail.)

Although many members of the Armed Forces acquire valuable skills during their military service, it is difficult to determine from the Armed Forces listing the transferability of their skills to civilian life. An employer interviewing a Navigation/Bombing Trainer and Flight Simulator Specialist, for example, may never suspect that the skills necessary for this service occupation are closely related to those needed by electronics technicians.

Recently, the Army, Navy, and Marine Corps, in concert with the Bureau of Apprenticeship and Training, have established registered apprenticeship programs for uniformed personnel. Only occupations that are comparable or identical to civilian occupations are registered, however. Individuals participating in a program record their hours of training and work assignments in a logbook that documents their service experience. The logbook thus becomes proof of their progress in the apprenticeship program and can be presented to an employer, labor union, or joint apprenticeship committee when they apply for a job.

Most service personnel are not in an apprenticeship program, however. To aid in "translating" military job titles, the Department of Defense, Office of the Assistant Secretary of Defense for Manpower and Reserve Affairs, has compiled a two-section Military-Civilian Job Comparability Manual. The first section relates military job specialties by service branch either "highly" or "substantially" to civilian occupations. A second section, essentially the inverse of the first, relates civilian job categories to military specialties. Although intended as a guide for employers and vocational counselors in job placement for the veteran, the manual can serve as a useful tool for occupational analysis.

Home study schools

Home study (correspondence) schools provide many individuals with an alternative means of education and training. Courses vary in length, skill level, and degree of specialization and emphasize vocational, academic, or simply personal enrichment.

In 1976, about 3.5 million students were enrolled in home study courses, according to the National Home Study Council (NHSC). The majority, 1.4 million students, were enrolled in Federal Government and military programs while 1.2 million took courses offered by schools accredited by the National Home Study Council. Most of the remaining home study students were enrolled in programs offered by colleges, universities, and religious organizations.

Information on home study is scarce. Few comprehensive studies have been completed that provide a basis for a thorough analysis of past trends in enrollments, completion rates, and the usefulness of these courses in career development. But the limited information indicates that the demand for home study has grown considerably over the past decade and is expected to continue because it is a convenient and relatively low-cost method of obtaining new knowledge or skills.

Community and junior colleges

Since the turn of the century, community and junior colleges have become an integral part of the American educational system. Originally, these schools served primarily as an intermediate step for students between high school and a 4-year college. Over the years, however, providing vocational training for technical and semiprofessional jobs has become equally important.

Most community and junior colleges offer a wide variety of courses and programs. Arts and science programs offer a general educational background for students planning to transfer to a 4-year college. Students specializing in a particular field may enroll in vocational or occupational curriculums such as dental hygiene or banking and finance, typically lasting about 2 years, for which a student usually receives an associate degree. According to the American Association of Community and Junior Colleges, the number of schools in operation grew about 82 percent between 1960 and 1977, and enrollments increased to over 6 times their 1960 level.

Each year graduates of community and junior colleges add substantially to the supply of workers entering the labor force. According to recent surveys,[9] the number of associate degrees and other awards granted below the baccalaureate has increased tremendously during the 1970's. About 423,00 awards were granted in academic year 1975-76, an increase of 8.8 percent over the previous year and 54.6 percent over 1971-72. Awards in occupational curriculums, constituting 57.5 percent of all awards granted in 1975-76, have risen the most in recent years. (Appendix table C-5 provides occupational curriculum data only.)

Unfortunately, projections of degrees awarded below the baccalaureate are not available. Because community and junior colleges can quickly adjust their programs to meet new employment situations and student interest, radical changes in enrollments in particular curriculums can and do take place in a short period of time. For this reason, reliable degree projections based on past trends and future expectations are difficult to make. Without these projections, a critical component is missing for the development of employment outlook for specific occupations. Some information on future enrollments may be obtained from State and local community and junior college administrators.

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[9] The Higher Education General Information Survey (HEGIS) of the National Center for Education Statistics (NCES) provides annual data on associate degrees and other awards below the baccalaureate, including those granted by 4-year colleges. Generally, 2-year colleges have awarded about 85 percent of these degrees. Unfortunately, only some of the data collected by NCES can be used to estimate the number of new graduates entering specific occupations, because many categories are too broad to allow for meaningful estimates. For example, to estimate the number of 2-year graduates qualified to become cosmetologists, the personal service technologies category must be broken down into its more specific components, which cannot be done from the data now available.

Colleges and universities

Colleges and universities serve many purposes, including providing individuals with specific occupational training. A college education provides the necessary background to enter fields such as engineering, law, business, the humanities, and the natural sciences.

The length of a college education depends on the student's interests and career goals. Most students seek employment after obtaining a bachelor's degree, which usually requires 4 years. Those who wish to qualify for positions requiring more specialized knowledge often continue their study. Master's, doctorate, and first professional degree programs require several additional years of study after the bachelor's degree. Occasionally, these programs accept students after 2 or 3 years of undergraduate work.

College and university enrollments increased steadily during the 1950's and 1960's, but the rate of increase slowed in the early 1970's and enrollments declined slightly in the fall of 1976 (table 9). Although no single factor was responsible for this decline, the tight job market for college graduates and the expectation it would continue surely influenced the decisions of many students.

Earned degrees are closely related to enrollments. The number of degrees conferred by 4-year institutions has increased throughout the 1960's and 1970's. During the 1975-76 academic year in the 50 States and the District of Columbia, 925,746 persons earned bachelor's degrees, 62,649 earned first professional degrees, 311,771 earned master's degrees, and 34,064 earned doctorates. The 1976 decline in enrollments may be reflected in a decline in the number of earned degrees in future years.[10]

Entry rates. Projections of degrees by curriculum play a vital part in estimating employment prospects in specific occupations. Since many graduates do not pursue careers in their field of study, however, projections alone will not provide an accurate estimate of future supply. For this reason, entry rates must be developed that indicate the probability that a college graduate who majors in a particular subject area will enter a specific occupation. These entry rates are calculated from followup studies conducted during or after training and generally include data on field of study and intended or current occupation.

Studies have shown that the proportions of graduates of occupationally oriented programs directly entering related

Table 9. Enrollments in 4-year institutions of higher education, and earned degrees, by level, in the 50 States and the District of Columbia, 1965-66 to 1976-77

Academic year	Total enrollments[1]	Earned degrees			
		Bachelor's	First professional	Master's	Doctor's except first professional
1965-66	4,747,912	520,923	30,124	140,548	18,237
66-67	[2] 5,064,000	558,852	31,695	157,707	20,617
67-68	[2] 5,398,000	632,758	33,939	176,749	23,089
68-69	5,720,795	729,071	35,114	193,756	26,188
69-70	6,028,002	792,656	34,578	208,291	29,866
70-71	6,357,679	839,730	37,946	230,509	32,107
71-72	6,462,733	887,273	43,411	251,633	33,363
72-73	6,549,073	922,362	50,018	263,371	34,777
73-74	6,590,023	945,776	53,816	277,033	33,816
74-75	6,819,735	922.933	55,916	292,450	34,083
75-76	7,214,740	925,746	62,649	311,771	34.064
76-77	7,128,816	[3]919,577	[3]64,386	[3]317,164	[3]33,232

[1] Fall of academic year.
[2] Estimated.
[3] Preliminary.

SOURCE: U.S. Department of Health, Education, and Welfare, National Center for Education Statistics.

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[10] In addition to collecting current data, the NCES annually develops 10-year projections of enrollments and degrees granted by curriculum at the baccalaureate level and above. Projections, along with a discussion of the projection methodology, are published by the NCES in *Projections of Education Statistics to 1985-86 (NCES 77-402).* Projections of total degrees over the 1976-86 period are presented in the section of chapter 4 dealing with the outlook for college graduates, and projections by field are presented in the individual occupations discussed in chapter 4.

The Bureau of Health Manpower within the Health Resources Administration, U.S. Public Health Service, U.S. Department of Health, Education, and Welfare, has collected training data health manpower and developed projections of completions of formal training programs for a number of health-related occupations. Several of these projections are included in discussions of individual health occupations in chapter 4.

occupations tend to be very high, particularly if training takes a number of years. For example, almost 100 percent of medical school graduates enter medicine and about 85 percent of engineering school graduates enter engineering. However, for many liberal arts graduates, whose training is less occupationally oriented, entry rates into occupations related to a college major are substantially lower. This is especially true at the bachelor's degree level since many graduates enter professional school, teaching, or occupations where a college degree in any one of a number of fields may be adequate preparation.

Comprehensive followup data on college students are available from the American Council on Education (ACE) surveys of college freshmen in 1961 and 1966. The 1961 cohort included over 127,000 freshmen, of whom a sample was resurveyed in 1966 and 1971. The 1966 cohort included 254,000 freshmen surveyed at college entry, of whom a sample of 60,000 was resurveyed in 1971. The surveys asked questions on high school and college education, including major of bachelor's and higher degrees received, current employment and occupational status, work activity, and type of employer. These longitudinal data allow analysis of occupational entries and career development over the decade after college entry. Numerous studies based on the ACE surveys have been published, and the BLS has developed entry rates for specific occupations from the survey data.

Additional followup studies of college students and graduates are available from surveys conducted by college placement offices, professional societies, and other organizations. Most of these data are limited to graduates from a single institution or field.

Chapter 4. Relating Training to Occupational Needs

This chapter presents projections of job openings and the training information that the Bureau has gathered or developed as part of its occupational outlook program. Approximately 250 individual occupations are discussed. For each, a description of the ways workers are trained for the job is presented, along with summary statistics on 1985 projected employment, percent growth over the 1976-85 period, and annual openings over this period due to growth and replacement needs. For most occupations, replacement needs include openings due to deaths, retirements, and other labor force separations, but not those arising from transfers to other occupations. Transfers, however, account for a significant number of job openings in many occupations, and therefore estimates of average annual openings generally understate the actual number of jobs available.

Also included are the most recent data on the number of persons completing training. A dash means that statistics on training are not available. Data are for the following time periods:

Public vocational education completions - fiscal year 1976
Private vocational education completions - fiscal year 1976
Apprenticeship completions in programs registered with the Bureau of Apprenticeship and Training - calendar year 1976
Jobs Corps - fiscal year 1976
Junior college graduates - academic year 1975-76
College graduates - academic year 1975-76 and projected 1978-85 annual average (where available).

For occupations where sufficient data on supply are available, a brief supply-demand analysis is presented. Statistics on occupational requirements and training also are presented in tabular form in appendixes B and C.

A discussion of the overall outlook for college graduates for the 1976-85 period and some of the major implications of this outlook precedes the detailed occupational information.

The Outlook for College Graduates

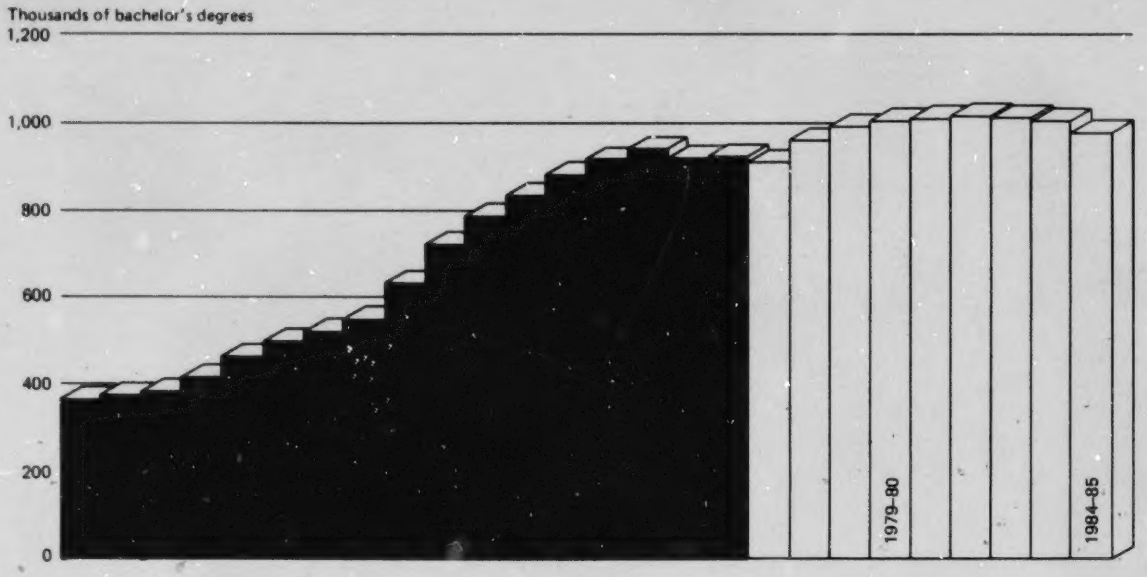
Throughout most of the 1960's, a college degree was considered almost a guarantee of a good job. Overall, there probably were more jobs for which employers sought graduates than there were graduates to fill them. Consequently, graduates generally had their pick of jobs and almost all graduates found the jobs they sought. Beginning about 1969, however, the job market for college graduates changed dramatically. The Nation's economic slowdown during the early and mid-1970's and the need for fewer teachers contributed to this turnabout. However, the principal reason has been the sharp increase in the number of bachelor's degrees granted (chart 4) and the higher proportions of college graduates seeking jobs. For example, between March 1966 and March 1976, the proportion of college graduates age 25 to 34 not in military service who were employed or looking for work increased from 79 to 85 percent.

Approximately twice as many college graduates entered the labor market between 1969 and 1976 as during the previous 7-year period (chart 5). Because job openings in the occupations which graduates traditionally sought have not been adequate, more and more graduates have entered nontraditional areas. Chart 5 compares the kinds of jobs graduates entered between 1962 and 1969 with those they entered between 1969 and 1976.

Of the roughly 4 million graduates who entered the labor force between 1962 and 1969, about 73 percent entered professional and technical occupations. This group includes accountants, engineers, doctors, lawyers, teachers, and other occupations for which a college degree usually is required. About 17 percent entered managerial and administrative occupations, another major occupational area generally felt by graduates to be appropriate for their education and abilities. Another 3 percent entered sales jobs, most probably in the better paying sales jobs such as securities sales workers and manufacturers' sales representatives. Less than 6 percent entered clerical, blue-collar, service, and farm occupations.

A different pattern emerged for the 8 million college graduates who entered the labor force between 1969 and 1976. Although more graduates entered professional and technical occupations than during the previous 7 years, because many more graduates were competing for available positions, a much smaller percentage—only 46 percent—

Chart 4. Bachelor's degrees earned increased rapidly during the 1960's, leveled off during the 1970's, and will remain on this plateau through 1985.



Source: National Center for Education Statistics

found professional and technical jobs. About 19 percent entered managerial jobs and another 8 percent entered sales jobs. It is estimated that about one-fourth of the graduates spilled over into occupations not previously sought or filled by college graduates. Most were clerical, blue-collar, service and farm occupations, but some were managerial and sales occupations. Most of the increase in the proportion entering managerial and sales jobs probably represents upgrading which occurs as jobs become more complex and therefore require people who have more education. The great majority of graduates who took clerical, service, blue-collar, and farm jobs over the 1969-76 period, however, did not enter upgraded positions.

Graduates also have experienced higher rates of unemployment than in the past. From early 1969 to early 1976, the unemployment rate for all graduates increased from less than 1 percent to 2.4 percent, and for graduates 20 to 24 years old from 2.4 to 6.1 percent. Although some of this increase can be attributed to generally poor economic conditions, the rise in the rate of unemployment of college graduates reflects mostly an increasing supply of graduates. Young graduates still fared much better than young high school graduates, however, who had an unemployment rate of 14.1 percent. The difference in rates indicates, for the most part, that graduates have been able to outbid nongraduates for jobs.

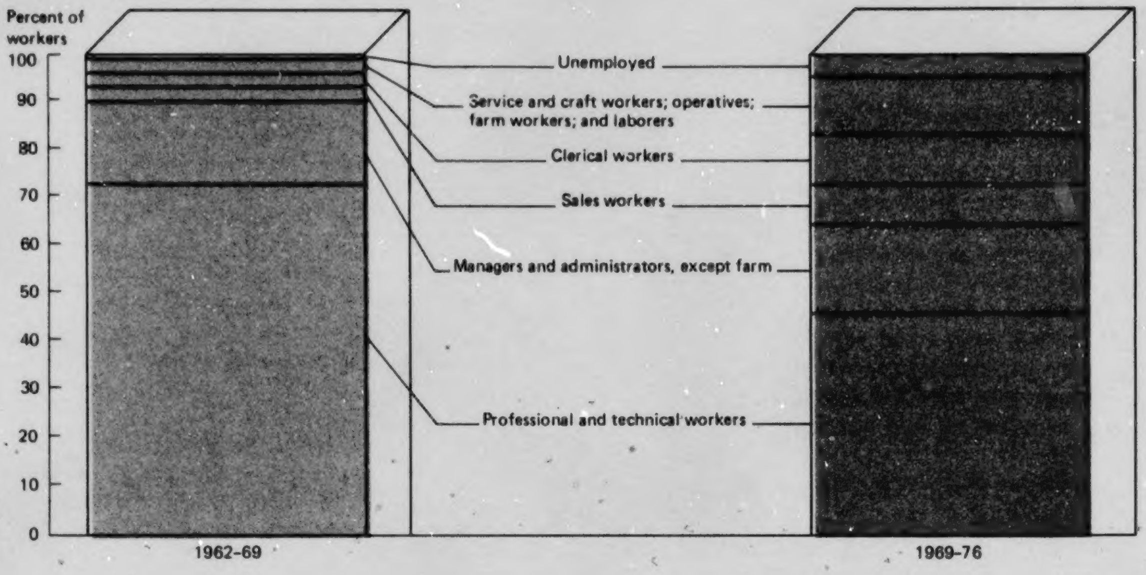
Overall, about 1 out of 4 graduates who entered the labor force between 1969 and 1976 had to take a job not sought or filled by graduates in better times, or was unemployed.

Increased competition for jobs also has adversely affected earnings. Although average salaries of newly hired graduates have risen since 1969, earnings of nongraduates have risen more rapidly. As a result, on average, the premium paid to college graduates has declined, both because competition in fields traditionally sought by graduates has kept salaries down and because relatively more graduates are in lower paying, nontraditional fields.

College graduates entering the labor force through the mid-1980's are likely to face job market conditions very similar to those faced by graduates during the early and mid-1970's as entrants continue to exceed openings in jobs traditionally sought by graduates. Therefore, about 1 graduate in 4 will have to enter a nontraditional occupation or face unemployment.

It is estimated that about 10.4 million college graduates will enter the labor force over the 1976-85 period, but only about 7.7 million job openings are expected to arise in traditional jobs for college graduates (chart 6). About half of these projected openings are expected to result from growth in the kinds of jobs filled by graduates in the past and from upgrading jobs, and half from the need to replace

Chart 5. Recent college graduates have been entering types of jobs graduates traditionally have not sought.



Source: Bureau of Labor Statistics.

graduates who retire, die, or leave the labor force for other reasons.

Like graduates in the early and mid-1970's, future graduates may be less likely to find jobs in the occupation of their choice than graduates during the 1960's. Many may be unemployed or have to move from job to job to find satisfying employment or compete with nongraduates for the more desirable jobs not previously filled by graduates. As in the past, college graduates will have an advantage over nongraduates but in some fields they may have to compete with junior and community college graduates who have learned job-related skills. In addition, there are some jobs, such as high-paying sales jobs, where proven sales ability may be valued more highly than a degree. Graduates who are less well prepared for the job market may be unable to make full use of their skills and thus experience job dissatisfaction. As in the early and mid-1970's, however, most graduates probably will find a job, and few should face sustained unemployment.

Although the employment outlook for college graduates may not be promising, neither is it bleak. Job satisfaction depends upon a number of factors that are difficult to analyze. College graduates might be satisfied in occupations not traditionally sought by graduates. Persons without college degrees have filled many high-paying responsible jobs in the past, and graduates can be expected to move into these in greater numbers. Graduates who enter clerical, sales, and blue-collar jobs may be able to prove their abilities on the job and be promoted. Some graduates who take jobs as clerks should be able to move into administrative positions, and those in craft and service jobs are likely to have an advantage in advancing within their organization or in starting their own business.

Finding a job directly related to one's college major probably is not necessary for job satisfaction. One study found that most liberal arts graduates—those whose college majors were in fields such as English, history, and psychology – generally were happy with jobs in business administration.[11] Business administration, like many other jobs, permits graduates to use their writing, analytical, and interpersonal skills. If graduates feel they are using these skills, they are likely to be satisfied with their jobs.

The study also found that a substantial proportion of graduates in jobs they considered nonprofessional, perhaps not fully utilizing these skills, were nevertheless satisfied.

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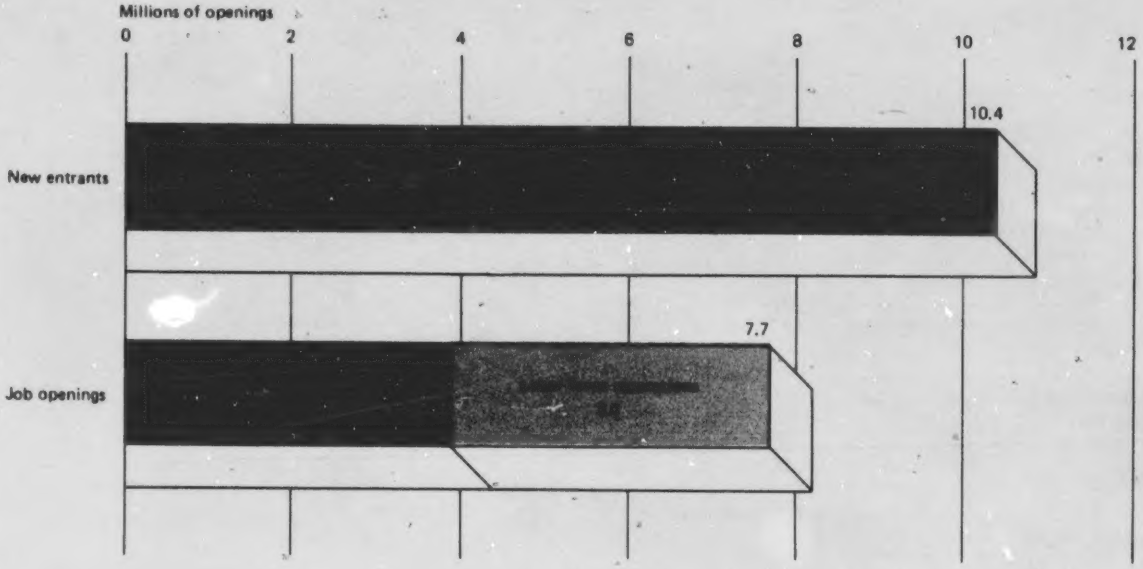
[11] *Job Satisfaction After College. . .* The Graduate's Viewpoint (Bethlehem, Pa., The CPC Foundation, 1977). The study is a followup of people who were freshmen in 1961, whose highest degree held was a bachelor's degree, and who were working full time between November 1974 and March 1975.

Chart 6. College graduates entering the labor force between 1976 and 1985 are expected to exceed openings in jobs traditionally filled by graduates by 2.7 million.



Source: Bureau of Labor Statistics

Ideas about what constitutes an appropriate job for graduates are changing. More and more graduates see jobs as craft workers, farmers, and self-employed retail store managers, those associated with "alternative life styles," as more desirable than the traditional jobs chosen by graduates. This shift in attitudes eases the problems of underemployment and job dissatisfaction for many college graduates.

It should be pointed out that the number of graduates entering the labor force may be lower than that projected in this bulletin because a higher proportion of high school graduates, aware of the plight of college graduates, may decide not to attend a 4-year college.

Compared to the job outlook for college graduates, the prospects for new Ph. D. recipients seeking jobs that traditionally have required an advanced degree is even less favorable. A recent BLS study indicated that 83,500 or 47 percent of the estimated 178,000 Ph. D.'s who entered employment between 1970 and 1976 accepted jobs of the type neither sought nor filled by Ph. D.'s during the 1960's.

Between 1976 and 1985, there are expected to be 192,800 openings in traditional jobs for Ph. D.'s. If past trends continue, 323,000 new Ph. D.'s are expected to enter the Ph. D. labor market. In addition, many Ph. D.'s presently in nontraditional jobs may compete for the available openings, although the actual number is difficult to predict.

Table 10 shows the projected supply-demand balance counting only the 323,000 new Ph. D.'s. Job openings are expected to be sufficient to absorb about 60 percent (192,800 of 323,000) of those seeking traditional Ph. D. jobs.

Table 11 shows the projected supply-demand balance assuming that Ph. D.'s presently employed in nontraditional jobs also compete for openings in traditional Ph. D. jobs. Job openings, therefore, will be sufficient to absorb only about 48 percent (192,800 of 403,200) of those seeking traditional Ph. D. jobs. Since about 53 percent of all new Ph. D.'s between 1970 and 1976 entered traditional jobs, the job outlook over the 1976-85 period for Ph. D.'s is projected to be comparable to that for the 1970-76 period. Only in engineering is the outlook substantially better.

Barring any unforeseen major increase in demand for Ph. D.'s or a large drop in the number of persons acquiring Ph. D.'s, new Ph. D.'s in most fields will continue to experience keen competition for traditional Ph. D. jobs. Consequently, many Ph. D.'s will be delayed in obtaining permanent employment in traditional areas, will continue to take nontraditional jobs, and may experience job dissatisfcation.

Table 10. Openings for traditional Ph. D. jobs and new supply by field, 1976-85

[Numbers in thousands]

Field	Openings for traditional Ph. D. jobs, 1976-85			Projected new supply, 1976-85	Number of entrants to nontraditional Ph.D. jobs, 1976-85	Entrants to nontraditional jobs as a percent of new supply, 1976-85
	Total	Growth	Deaths and retirements			
All fields	192.8	138.1	54.7	323.0	130.2	40.3
Engineering and natural science	100.8	72.5	28.3	114.7	13.8	12.1
Engineering	32.4	25.5	7.0	22.7	-9.7	-42.8
Physical science	27.4	17.9	9.5	30.7	3.3	10.8
Chemistry	14.7	9.4	5.2	16.6	1.8	11.2
Physics	3.7	1.5	2.2	7.6	3.9	51.2
Life science	35.4	25.6	9.8	51.7	16.2	31.4
Mathematics	5.6	3.5	.2	9.6	4.0	41.6
Social science and psychology	41.5	31.2	10.3	70.5	29.0	41.2
Arts and humanities	12.4	7.2	5.1	37.0	24.6	66.6
Education	31.5	22.5	9.1	80.4	48.8	60.8
Business and commerce	2.9	2.1	.8	8.0	5.1	63.6
Other fields	3.6	2.6	1.1	12.4	8.8	70.8

NOTE: Detail may not add to totals because of rounding.

Table 11. Openings, new supply, and nontraditionally employed Ph. D.'s, by field, 1976-85

[Numbers in thousands]

Field	Total openings for traditional Ph. D. jobs, 1976-85	Ph. D.'s potentially available to fill traditional Ph. D. jobs, 1976-85			Difference between potentially available Ph. D.'s and openings	Excess potentially available Ph. D.'s as a percent of new supply, 1976-85
		Total	Projected new supply, 1976-85	Ph. D.'s employed in nontraditional jobs in 1976		
All fields	192.8	403.2	323.0	80.2	210.4	65.1
Engineering and natural science	100.8	140.0	114.7	25.3	39.2	34.1
Engineering	32.4	27.7	22.7	5.0	-4.7	-20.9
Physical science	27.4	38.1	30.7	7.4	10.7	34.9
Chemistry	14.7	18.7	16.6	2.2	4.0	24.2
Physics	3.7	12.2	7.6	4.7	8.6	113.3
Life science	35.4	60.2	51.7	8.5	24.8	47.9
Mathematics	5.6	14.0	9.6	4.4	8.4	87.9
Social science and psychology	41.5	79.2	70.5	8.7	37.7	53.5
Arts and humanities	12.4	56.2	37.0	19.2	43.8	118.5
Education	31.5	103.4	86.4	3.1	71.9	89.5
Business and commerce	2.9	10.4	8.0	2.4	7.5	93.8
Other fields	3.6	13.9	12.4	1.5	10.3	82.9

NOTE: Detail may not add to totals because of rounding.

Industrial Production and Related Occupations

Foundry occupations

Patternmakers. A 5-year apprenticeship is considered the best way to learn this trade. Vocational school courses in patternmaking, metalworking, and machining may be credited toward completion of the apprenticeship. A high school diploma generally is required and courses in mechanical drawing, blueprint reading, and shop mathematics are helpful.

Employment, 1976	18,000
Projected employment, 1985	20,500
Percent growth, 1976-85	14.9
Average annual openings, 1976-85	900
Growth	300
Replacement	600
Available training data:	
Apprenticeship completions	129

Molders. Completion of a 4-year apprenticeship is the recommended way to learn skilled hand molding. Workers who have this training also are preferred for some kinds of machine molding. Some people learn molding skills informally on the job, but this way of learning the trade takes longer and is less reliable than apprenticeship. In addition to on-the-job training, apprenticeship programs include instruction in subjects such as shop mathematics, metallurgy, and shop drawing. An eighth grade education usually is the minimum requirement for apprenticeship; however, many employers prefer high school graduates. The less skilled hand molding jobs can be learned by inexperienced workers after 2 to 6 months of on-the-job training.

Employment, 1976	53,000
Projected employment, 1985	60,000
Percent growth, 1976-85	14.5
Average annual openings, 1976-85	1,900
Growth	800
Replacement	1,100
Available training data:	
Apprenticeship completions	[1] 147

[1] Includes some coremakers.

Coremakers. Completion of a 4-year apprenticeship is the recommended way to learn the trade. These programs combine on-the-job training with classroom instruction in subjects such as shop mathematics and the properties of metals. Applicants for apprenticeships must have at least an eighth grade education; however, most employers prefer high school graduates, and some require apprentices to have graduated. For less skilled coremaking jobs, inexperienced workers may be hired and trained on the job.

Employment, 1976	22,000
Projected employment, 1985	24,500
Percent growth, 1976-85	14.5
Average annual openings, 1976-85	1,000
Growth	300
Replacement	700
Available training data:	
Apprenticeship completions	(1)

[1] See molders.

Machining occupations

All-round machinists. A 4-year apprenticeship is the best way to learn the trade; however, some companies have shorter training programs for machinists who specialize in one type of product or machine. Many machinists learn their skills on the job. Apprenticeship programs combine on-the-job training with classroom instruction in mathematics, physics, and machine shop practices. Taking these courses in high school or vocational school is good preparation. A high school diploma is strongly recommended. Applicants should be mechanically inclined and able to do precise work that requires concentration as well as physical effort.

Employment, 1976	405,000
Projected employment, 1985	475,000
Percent growth, 1976-85	17.1
Average annual openings, 1976-85	20,000
Growth	8,000
Replacement	12,000
Available training data:	
Apprenticeship completions	2,526

Instrument makers (mechanical). Many instrument makers learn their trade through 4-year apprenticeships that combine on-the-job training with classroom instruction in mathematics, physics, and machine shop practices. Others advance from the ranks of machinists or skilled machine tool operators and usually require only 1 or 2 years of instrument shop experience to learn the trade. Employers generally prefer high school graduates, especially for apprenticeship programs. Courses in algebra, geometry, trigonometry, science, and machine shop work are useful.

Employment, 1976	6,000
Projected employment, 1985	6,900
Percent growth, 1976-85	17.1
Average annual openings, 1976-85	300
Growth	100
Replacement	200
Available training data	

Machine tool operators. These workers are classified as either semiskilled or skilled operators. Most are trained on the job. Just a few months of experience are required for most semiskilled operators to learn their trade, but 1 to 2 years of experience often are required for a person to become a skilled operator. Some operators receive training in vocational schools and apprenticeship programs that combine on-the-job experience with classroom instruction. A high school diploma is not required, but courses in mathematics and blueprint reading are helpful. Employers look for workers who have physical stamina and mechanical aptitude, or experience working with machinery.

Employment, 1976	508,000
Projected employment, 1985	595,000
Percent growth, 1976-85	16.9
Average annual openings, 1976-85	22,000
Growth	9,500
Replacement	12,500

Available training data:

Job Corps completions	98

Setup workers (machine tools). Setup workers usually must be qualified as all-round machinists. They have to know how to operate more than one type of machine tool and be able to plan the sequence of a machining operation so that metal parts will be made according to specifications. Being able to communicate clearly is important because setup workers must explain the machining operations that they set up to the semiskilled workers who will perform the work.

Employment, 1976	60,000
Projected employment, 1985	75,000
Percent growth, 1976-85	25.0
Average annual openings, 1976-85	3,500
Growth	1,700
Replacement	1,800

Available training data:

Apprenticeship completions	212

Tool-and-die makers. The best way to learn this trade is through a 4- or 5-year apprenticeship, but many workers learn in vocational school programs or on the job. Several years of experience often are required after completing an apprenticeship for more difficult tool-and-die work. High school graduates are preferred for apprenticeships. Applicants should have a good working knowledge of mathematics and physics, as well as considerable mechanical ability, finger dexterity, and aptitude for precise work.

Employment, 1976	183,000
Projected employment, 1985	215,000
Percent growth, 1976-85	17.5
Average annual openings, 1976-85	9,000
Growth	3,600
Replacement	5,400

Available training data:

Private vocational education completions	([1])
Apprenticeship completions	1,901

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[1] Less than 50.

Printing occupations

Compositors. Some compositors learn their trade through apprenticeships, which generally require 6 years of on-the-job training supplemented by classroom instruction or correspondence courses. Applicants for apprenticeships usually must be high school graduates.

Most compositors learn their trade on the job by working as helpers for several years; others combine trade school and helper experience. Many technical institutes, junior colleges, and colleges offer courses in printing technology which provide a valuable background for people who want to be compositors. An increasing number of persons entering the trade are not following the traditional apprenticeship route, but are learning their skills through on-the-job training. Some jobs, such as tape-perforating machine operator and computer-typesetting operator, can be learned in a year or less.

Employment, 1976	152,000
Projected employment, 1985	140,000
Percent change, 1976-85	-7.9
Average annual openings, 1976-85	3,600
Decline	-1,300
Replacement	4,900

Available training data:

Apprenticeship completions	264

Lithographers. Although most lithographers learn their trade on the job by helping experienced lithographers, employers recommend a 5-year apprenticeship program which combines on-the-job training with classroom instruction. Apprenticeship programs may emphasize a specific craft, such as camera operator or platemaker, although an attempt is made to introduce an apprentice to all lithographic operations. Applicants for apprenticeships usually must be high school graduates.

Two-year programs in printing technology, which many technical institutes, junior colleges, and colleges offer, provide a valuable background for people who want to be lithographers. High school and vocational school courses in printing, photography, mathematics, chemistry, and art also are useful.

Employment, 1976	29,000
Projected employment, 1985	39,000
Percent growth, 1976-85	34.5
Average annual openings, 1976-85	1,900
Growth	1,100
Replacement	800

Available training data:

Apprenticeship completions	292

Photoengravers. Most photoengravers learn their skills through a 5-year apprenticeship program that combines on-the-job training with classroom instruction. Applicants for apprenticeships usually must be high school graduates; courses in printing, chemistry, and physics are useful.

Employment, 1976	10,000
Projected employment, 1985	9,000
Percent change, 1976-85	-10.0
Average annual openings, 1976-85	100
Decline	-100
Replacement	200
Available training data	

Electrotypers and stereotypers. A 5- to 6-year apprenticeship that combines on-the-job training with classes in related technical subjects is the usual preparation for these trades. Applicants for apprenticeships usually must be high school graduates. A physical examination also generally is required, because workers must do some heavy lifting.

Employment, 1976	4,000
Projected employment, 1985	3,200
Percent change, 1976-85	-20.4
Average annual openings, 1976-85	60
Decline	-90
Replacement	150
Available training data	

Printing press operators and assistants. The recommended way to learn the press operator's trade is through an apprenticeship program that combines on-the-job training with classroom or correspondence school work. The apprenticeship program in commercial printing shops lasts 2 years for press assistants and 4 to 5 years for press operators. Applicants for apprenticeships usually must be high school graduates.

Many workers learn their skills on the job by working as helpers or press assistants, or through a combination of work experience and training in vocational or technical schools. High school or vocational school courses in printing, physics, and chemistry are recommended.

Employment, 1976	145,000
Projected employment, 1985	160,000
Percent growth, 1976-85	11.0
Average annual openings, 1976-85	5,100
Growth	1,800
Replacement	3,300
Available training data:	
Job Corps completions	292
Apprenticeship completions	466

Bookbinders and bindery workers. A 4- or 5-year apprenticeship that combines on-the-job training with related classroom instruction generally is the recommended type of training for skilled bookbinders. Applicants for apprenticeships usually must be high school graduates. Because bindery workers need not be as skilled as bookbinders, they learn their trade through informal on-the-job training that may last from several months to 2 years.

Bookbinders must be in good physical condition because the work involves much standing, lifting, and carrying.

Employment, 1976	80,000
Projected employment, 1985	85,000
Percent growth, 1976-85	6.0
Average annual openings, 1976-85	3,400
Growth	500
Replacement	2,900
Available training data:	
Public vocational education completions	[1] 17,859
Job Corps completions	18
Apprenticeship completions	[2] 122

[1] Includes completions for bookbinders, composing room occupations, lithographic occupations, press operators, and miscellaneous printing occupations.

[2] There were also 1,252 apprenticeship completions for occupations listed in footnote 1. The number being trained for each occupation cannot be determined from available data.

Other industrial production and related occupations

Assemblers. Training varies according to the level of skill required. Most inexperienced persons can be trained on the job in a few days or weeks, but for some types of complicated assembly work, training lasts much longer. Employers look for workers who can do routine work at a fast pace. Although a high school diploma usually is not required, vocational school courses, such as machine shop, may be helpful, especially for the more highly skilled jobs.

Employment, 1976	1,100,000
Projected employment, 1985	1,450,000
Percent growth, 1976-85	33.3
Average annual openings, 1976-85	70,000
Growth	40,000
Replacement	30,000
Available training data:	
Job Corps completions	276

Automobile painters. Most of these workers start as helpers and acquire their skills informally on the job by working for 3 to 4 years with experienced painters. A small number learn through a 3-year apprenticeship. A high school diploma usually is not required. Good color sense and the ability to do precise work are helpful personal characteristics.

Employment, 1976	32,000
Projected employment, 1985	37,000
Percent growth, 1976-85	15.6
Average annual openings, 1976-85	1,300
Growth	600
Replacement	700
Available training data	

Blacksmiths. Many blacksmiths are trained on the job while working as helpers in blacksmith shops or industrial firms that employ blacksmiths. Some enter through 3- or 4-year apprenticeship programs that combine on-the-job experience with classroom instruction in blueprint reading, forging methods, and related subjects. Vocational school or high school courses in metalworking and blueprint reading are helpful. A high school diploma is not required.

Blacksmiths who shoe horses are called farriers. Most farriers learn their craft by assisting experienced workers. Others take a 3- or 4-week course in horseshoeing before gaining experience on their own or as a farrier's assistant. Several colleges and private horseshoeing schools, mostly in the Midwest, teach courses in horseshoeing. At least 3 to 5 years of special training or experience are needed to obtain the skills necessary to shoe racehorses. Farriers who work at racetracks must pass a licensing examination during which they demonstrate their knowledge of corrective shoeing techniques and proper choice of shoes for various track conditions.

Employment, 1976	10,000
Projected employment, 1985	6,000
Percent change, 1976-85	-33.3
Average annual openings, 1976-85	100
Decline	-400
Replacement	500
Available training data	-

Blue-collar worker supervisors. Most blue-collar supervisors are high school graduates who have risen through the ranks and learned their skills on the job. Rising through the ranks gives supervisors the advantage of knowing how the work should be done and what problems may arise. Supervisors sometimes are former union representatives who are familiar with grievance procedures and union contracts. To supplement work experience, most employers provide either written materials or classroom training covering subjects such as communication skills, motivation, and management decisionmaking.

Although fewer than one-tenth of all supervisors are college graduates, a growing number of employers are hiring supervisor trainees who have college backgrounds. This is most prevalent in industries with highly technical production processes, such as the chemical, oil, and electronics industries. Employers prefer backgrounds in business administration, industrial relations, mathematics, engineering, or science.

Employment, 1976	1,445,000
Projected employment, 1985	1,775,000
Percent growth, 1976-85	22.9
Average annual openings, 1976-85	79,000
Growth	37,000
Replacement	42,000
Available training data:	
Public vocational education completions	12,105

Boilermaking occupations. Included in this group are layout workers, fitters, and boilermakers. Most layout workers and fitters are hired as helpers and learn the craft by working with experienced employees. It generally takes about 2 years or more to become skilled at these jobs. Although many boilermakers also learn their trade on the job, most training authorities recommend a 4-year apprenticeship. For all three occupations, employers prefer high school or vocational school graduates who have had courses in shop, mathematics, blueprint reading, welding, and machine metalworking. Due to the strenuous nature of the jobs, most firms require applicants to pass a physical examination.

Employment, 1976	34,000
Projected employment, 1985	56,000
Percent growth, 1976-85	64.7
Average annual openings, 1976-85	3,800
Growth	2,400
Replacement	1,400
Available training data:	
Apprenticeship completions	508

Boiler tenders. Most of these workers acquire their skills by working as helpers or oilers in boiler rooms. High school graduation usually is not required; however, courses in mathematics, motor mechanics, chemistry, and blueprint reading may be helpful. Stamina and endurance are necessary because boiler tenders are exposed to noise, heat, fumes, and smoke on the job. Some large cities and a few States require boiler tenders to be licensed. Applicants for a license must pass a written test.

Employment, 1976	73,000
Projected employment, 1985	72,000
Percent change, 1976-85	-1.4
Average annual openings, 1976-85	1,500
Decline	-100
Replacement	1,600
Available training data	-

Electroplaters. Most electroplaters learn their trade on the job, but a small percentage learn through a 3- or 4-year apprenticeship program that combines on-the-job training with classroom instruction. Applicants for apprenticeships usually must be high school graduates. A few people take 1- or 2-year courses in electroplating that are offered by junior colleges, technical institutes, and vocational schools. High school or vocational school courses in chemistry, electricity, physics, mathematics, and blueprint reading are useful.

Employment, 1976	36,000
Projected employment, 1985	41,000
Percent growth, 1976-85	12.9
Average annual openings, 1976-85	1,300
Growth	500
Replacement	800
Available training data	-

Forge shop occupations. Most workers learn these trades on the job. Generally, they start as helpers or heaters on hammer or press crews and learn by watching and assisting experienced workers. Thus, new workers begin at the bottom of the ladder and advance to more skilled occupations as they gain experience and as openings occur. Some forge shops offer 4-year apprenticeship programs for skilled jobs, such as die sinker and heat treater. These programs combine on-the-job experience with classroom instruction in metal properties, power hammer and furnace operation, blueprint reading, safety, and other machine shop subjects. High school graduation generally is not required, but may be preferred for the more skilled occupations. Workers need stamina and endurance to work in the heat and noise of a forge shop, and strength to lift and move heavy forgings and dies.

Employment, 1976	71,000
Projected employment, 1985	80,000
Percent growth, 1976-85	13.3
Average annual openings, 1976-85	2,700
Growth	1,000
Replacement	1,700
Available training data	

Furniture upholsterers. The most common way to learn this trade is to work with experienced upholsterers for about 3 years and acquire skills on the job. Vocational or high school courses in upholstery provide a good background, but experience on the job still is necessary to refine one's skills. A high school diploma is not required.

Employment, 1976	27,000
Projected employment, 1985	27,700
Percent growth, 1976-85	2.6
Average annual openings, 1976-85	1,100
Growth	100
Replacement	1,000
Available training data:	
Public vocational education completions	[1] 4,336
Private vocational education completions	600
Job Corps completions	125

[1] Includes some upholsterers other than furniture.

Inspectors (manufacturing). Inspectors generally learn their skills on the job. Depending on the skill required for the particular job, training may last from a few hours to several months. Requirements for the job vary. Some employers hire applicants who do not have a high school diploma, but who have worked as an assembler and are able to follow instructions and concentrate on details. Good eyesight with or without glasses – usually is necessary.

Employment, 1976	692,000
Projected employment, 1985	950,000
Percent growth, 1976-85	37.5
Average annual openings, 1976-85	52,000
Growth	29,000
Replacement	23,000
Available training data	

Millwrights. Generally, these workers learn their skills on the job. New employees start as helpers to skilled workers and rotate from job to job for 6 to 8 years. Millwrights also are trained through 4-year apprenticeship programs that combine on-the-job training with classroom instruction, blueprint reading, mathematics, welding, and safety. On-the-job training covers the use of hoisting equipment and the installation, assembly, and repair of industrial machinery. Good physical condition is required. High school courses in science, mathematics, mechanical drawing, and machine shop are useful.

Employment, 1976	96,000
Projected employment, 1985	105,000
Percent growth, 1976-85	9.4
Average annual openings, 1976-85	3,600
Growth	1,000
Replacement	2,600
Available training data:	
Apprenticeship completions	933

Motion picture projectionists. Most motion picture theaters in urban areas are unionized and projectionists in these theaters must meet union membership requirements. Some union locals accept only persons who have experience running theater projectors. Other locals conduct apprenticeship programs for inexperienced persons. In these programs, apprentices work with a variety of projection equipment under the supervision of experienced projectionists. They also may take courses in basic electronics and mechanics. In a non-union theater, a trainee may start as an usher or helper and learn the trade by working with an experienced projectionist.

A high school diploma is preferred by employers and may be required by union locals. Experience with projectors gained while serving in the Armed Forces is helpful. Local governments may require projectionists to be licensed.

Employment, 1976	16,500
Projected employment, 1985	17,000
Percent growth, 1976-85	3.0
Average annual openings, 1976-85	1,200
Growth	0
Replacement	1,200
Available training data	

Ophthalmic laboratory technicians. Most technicians learn their skills on the job, but some learn through 3- to 4-year apprenticeship programs that combine on-the-job training with classroom instruction. Some technicians receive training in the Armed Forces. Employers prefer high school graduates; applicants for apprenticeships usually must be graduates. High school courses in the basic sciences are useful. Some States require ophthalmic laboratory technicians in retail optical shops to be licensed. Applicants for a license must pass an examination.

Employment, 1976	22,000
Projected employment, 1985	29,000
Percent growth, 1976-85	29.3
Average annual openings, 1976-85	1,500
Growth	700
Replacement	800

Available training data ....

Photographic laboratory occupations. Most photographic laboratory workers learn their skills through on-the-job training. High school graduates generally are preferred by employers. Some trainees become specialists in a particular laboratory procedure; training time for one of these semiskilled occupations ranges from a few weeks to several months. Other trainees become all-round technicians, learning their trade in about 3 years. College courses in photographic technology are useful for technicians who wish to become supervisors or managers.

Employment, 1976	35,000
Projected employment, 1985	47,000
Percent growth, 1976-85	34.0
Average annual openings, 1976-85	2,400
Growth	1,300
Replacement	1,100

Available training data:

Public vocational education completions	[1] 3,361
Junior college graduates	[1] 810

[1] May include other photographic occupations.

Power truck operators. Newly hired operators are trained on the job. Most workers can learn how to operate a power truck in just a few days, but it may take several weeks to learn the physical layout and operation of a plant and the most efficient way of handling the materials to be moved. Some power truck manufacturers conduct short training courses for operators employed by their customers. A high school diploma is not required.

Employment 1976	360,000
Projected employment, 1985	433,000
Percent growth, 1976-85	21.7
Average annual openings, 1976-85	14,600
Growth	8,600
Replacement	6,000

Available training data ....

Production painters. New workers usually learn by watching and helping experienced painters. Beginners often start out assigned to loading and unloading the conveyor lines that carry the items to be painted. Training may vary from a few days to several months. A high school diploma is not required. Good physical condition is necessary because painters must stand, stoop, and bend in their work, and are exposed to fumes.

Employment, 1976	104,000
Projected employment, 1985	143,000
Percent growth, 1976-85	37.5
Average annual openings, 1976-85	6,900
Growth	4,300
Replacement	2,600

Available training data ....

Stationary engineers. Many stationary engineers start as helpers or craftworkers in other trades and acquire their skills informally during many years on the job. This experience can be supplemented by technical or other training in vocational schools or through home study. A good background also can be obtained in the Navy or Merchant Marine. Most training authorities, however, recommend completion of a 4-year apprenticeship as the best way to learn this trade. These programs combine on-the-job training with classroom instruction in practical chemistry, blueprint reading, and other technical subjects.

Employers prefer to hire high school graduates; high school or vocational school courses in mathematics, machine shop, mechanical drawing, chemistry, and physics are an asset. Many States and larger cities require stationary engineers to be licensed. Each of the six classes of license specify the steam pressure or horsepower of the equipment the engineer may operate. A high school diploma may be required for higher class licenses. Generally, applicants must be at least 18, meet the experience requirements for the class of license, and pass a written examination.

Employment, 1976	194,000
Projected employment, 1985	194,000
Percent growth, 1976-85	0.0
Average annual openings, 1976-85	7,400
Growth	0
Replacement	7,400

Available training data:

Public vocational education completions	2,350
Apprenticeship completions	288

Wastewater treatment plant operators (sewage plant operators). Trainees usually start as helpers and learn their skills on the job. Some States require, and employers generally prefer, persons who have at least a high school diploma or its equivalent. Some positions, especially in larger cities and towns, are covered by civil service regulations and applicants may be required to pass examinations on elementary mathematics, mechanical aptitude, and general intelligence. A 2-year program leading to an associate degree in wastewater technology provides a good general knowledge of the water pollution control field, as well as basic preparation for the job. Vocational schools also provide courses in wastewater treatment.

In 40 States, operators who are supervisors or responsible for a plant's operation must pass an examination certifying that they are capable of overseeing treatment operations. Voluntary certification programs exist in the remaining States, excluding Alaska.

Employment, 1976	100,000
Projected employment, 1985	150,000
Percent growth, 1976-85	51.0
Average annual openings, 1976-85	10,400
Growth	5,600
Replacement	4,800
Available training data	

Welders. There are several levels of skill within this occupation and the training time varies accordingly. Some less skilled jobs can be learned in a few months on the job, but generally it takes several years of training and experience to become a skilled welder. For entry to skilled jobs, many employers prefer to hire applicants who have high school or vocational school training in welding. Before being assigned to work where the strength of the weld is a highly critical factor, welders may be required to pass a qualifying examination given by an employer or government agency.

Employment, 1976	660,000
Projected employment, 1985	835,000
Percent growth, 1976-85	26.3
Average annual openings, 1976-85	33,800
Growth	19,300
Replacement	14,500
Available training data:	
Public vocational education completions	40,840
Private vocational education completions	9,700
Job Corps completions	1,593

Office Occupations

Clerical occupations

Bookkeeping workers. High school graduates who have taken business arithmetic, bookkeeping, and accounting meet the minimum requirements for most bookkeeping jobs. Some employers prefer applicants who have completed business courses at a junior college or business school and have had some work experience. General knowledge of how computers are used to perform bookkeeping transactions is very helpful, as is the ability to type and use various office machines. Cooperative work/study programs also can provide high school students with an opportunity to learn bookkeeping skills through on-the-job experience.

Employment, 1976	1,700,000
Projected employment, 1985	1,900,000
Percent growth, 1976-85	12.8
Average annual openings, 1976-85	95,000
Growth	23,900
Replacement	71,100
Available training data:	
Job Corps completions	76

Cashiers. Many cashiers learn their skills on the job under the supervision of an experienced cashier. In large firms, training often includes classroom instruction in the use of electronic or computerized cash registers and other phases of the job. Cashier training also is available in many public school vocational programs. The cashier's job may serve as a stepping stone to a more responsible clerical position or to a supervisory or managerial job.

Employment, 1976	1,250,000
Projected employment, 1985	1,640,000
Percent growth, 1976-85	30.5
Average annual openings, 1976-85	92,000
Growth	43,000
Replacement	49,000
Available training data:	
Job Corps completions	92

Collection workers. Newly hired workers are trained on the job and learn chiefly by observing experienced workers. A high school diploma generally is required. Business courses are good preparation and the ability to get along with different people is very important.

Employment, 1976	64,000
Projected employment, 1985	80,000
Percent growth, 1976-85	25.5
Average annual openings, 1976-85	4,400
Growth	1,800
Replacement	2,600
Available training data	

File clerks. Newly hired workers usually are given several weeks or months of on-the-job training to learn the employer's filing system and procedures. High school graduates usually are preferred for beginning jobs. Most employers seek applicants who can type and have some knowledge of office practices. These and other office skills can be learned in high schools, vocational schools, private business schools, and community and junior colleges. In addition, many States and localities sponsor programs which furnish training in basic clerical skills, particularly to prepare underemployed and low-skilled workers for entry level jobs.

Employment, 1976	270,000
Projected employment, 1985	320,000
Percent growth, 1976-85	19.0
Average annual openings, 1976-85	16,500
Growth	5,700
Replacement	10,800
Available training data:	
Job Corps completions	342

Hotel front office clerks. High school graduation is the usual requirement for front office jobs. Newly hired workers usually begin as mail, information, or key clerks and are trained on the job. College training is an asset for advancement to managerial jobs. Most hotels fill front office jobs by promotion from within, so that a key or mail clerk may be promoted to room clerk, then to assistant front office manager, and eventually to front office manager. Clerks can improve their opportunities for promotion by taking courses in hotel management offered by colleges, junior colleges, and vocational schools, or by taking home study courses, such as those offered by the Educational Institute of the American Hotel and Motel Association.

Employment, 1976	62,000
Projected employment, 1985	68,000
Percent growth, 1976-85	9.3
Average annual openings, 1976-85	3,300
Growth	600
Replacement	2,700
Available training data	

Office machine operators. These workers generally are trained on the job; the amount of training varies with the type of machine being operated. Training can range from a few days for duplicating machine operators to several months of training at a manufacturer's school for bookkeeping and billing machine operators. Employers prefer to hire high school or business school graduates and generally expect applicants to be able to type and know how to operate adding machines and calculators. A knowledge of business arithmetic also is helpful. Many high schools, vocational schools, and State and local training programs teach these skills.

Employment, 1976	163,000
Projected employment, 1985	180,000
Percent growth, 1976-85	10.4
Average annual openings, 1976-85	7,700
Growth	1,900
Replacement	5,800
Available training data:	
Job Corps completions	10

Postal clerks. These workers are trained on the job. Applicants must be at least 18 except for high school graduates, who must be at least 16. Applicants must pass an examination that tests clerical accuracy, and the ability to read, do simple arithmetic, and memorize mail sorting systems. Applicants also must pass a physical examination and may have to show that they can handle mail sacks weighing up to 70 pounds.

Employment, 1976	270,000
Projected employment, 1985	240,000
Percent change, 1976-85	-9.8
Average annual openings, 1976-85	3,700
Decline	-2,900
Replacement	6,600
Available training data:	
Job Corps completions	78

Receptionists. Receptionists are trained on the job and usually can learn the proper office procedures in a month. If operating a switchboard is part of the job, this skill may take longer to learn. A high school diploma generally is required and courses in English, typing, and elementary bookkeeping are helpful. Some employers prefer applicants who have had some college training. College or business school training can help a receptionist advance to secretary or administrative assistant.

Employment, 1976	500,000
Projected employment, 1985	640,000
Percent growth, 1976-85	27.5
Average annual openings, 1976-85	38,000
Growth	15,500
Replacement	22,500
Available training data:	
Job Corps completions	52

Secretaries and stenographers. High school graduation is the minimum educational requirement for practically all secretarial and stenographic positions. Good spelling, punctuation, and grammar are important skills. Many employers prefer to hire applicants who have had additional training at a public or private vocational school or in college. These courses range in length from several months' instruction in shorthand and typing to 1- or 2-year programs that teach specialized skills, such as legal or medical secretarial work. Employers generally test applicants to see that they meet minimum standards of typing (50 words per minute) and stenographic speed (110 words per minute). Persons seeking a job as a shorthand reporter should be able to transcribe 225 words per minute.

Fourteen States require court reporters to be Certified Shorthand Reporters (CSR's). Certification is administered by a board of examiners in each State. The National Shorthand Reporters Association confers the designation Registered Professional Reporter (RPR) upon individuals who pass a two-part examination and participate in continuing education programs. This designation, which is widely recognized as a mark of excellence in the field, can be substituted for the CSR in some of the States which require it.

The mark of achievement in the secretarial field is the designation Certified Professional Secretary (CPS), which the National Secretaries Association awards to individuals who pass a series of examinations.

Employment, 1976	3,500,000
Projected employment, 1985	4,800,000
Percent growth, 1976-85	37.1
Average annual openings, 1976-85	295,000
Growth	145,000
Replacement	150,000
Available training data:	
Public vocational education completions	151,541
Private vocational education completions	33,700

Job Corps completions	145
Junior college graduates	19,704
Bachelor's degrees in secretarial studies	1,538

Shipping and receiving clerks. High school graduates are preferred for beginning jobs in shipping and receiving departments. English, typing, business arithmetic, and other high school or vocational school business subjects are helpful. Newly hired workers are trained on the job and often begin by filing, checking addresses, attaching labels, and verifying the contents of shipments. After gaining experience, clerks may be assigned more responsible tasks, such as dealing with damaged merchandise.

Employment, 1976	440,000
Projected employment, 1985	535,000
Percent growth, 1976-85	21.2
Average annual openings, 1976-85	23,000
Growth	10,500
Replacement	12,500
Available training data	

Statistical clerks. A high school diploma or its equivalent is required for most jobs as statistical clerks. Newly hired workers are trained on the job and taught their employers' record systems and procedures. In some instances, individuals are hired as general office clerks before being promoted to statistical clerk. High school courses in mathematics, data processing, bookkeeping, and typing are good preparation.

Employment, 1976	337,000
Projected employment, 1985	410,000
Percent growth, 1976-85	21.4
Average annual openings, 1976-85	21,000
Growth	8,000
Replacement	13,000
Available training data	

Stock clerks. There are no specific educational requirements for beginning stock clerks, although employers prefer to hire high school graduates. The ability to read and write well and a knowledge of arithmetic are necessary; knowing how to type and file is useful. Newly hired workers learn their skills on the job and usually begin by counting and marking stock. Basic duties usually are learned in a few weeks. Stock clerks who handle jewelry, liquor, or drugs must be bonded (which requires good character references).

Employment, 1976	490,000
Projected employment, 1985	585,000
Percent growth, 1976-85	18.7
Average annual openings, 1976-85	25,000
Growth	10,500
Replacement	14,500
Available training data:	
Job Corps completions	190

Typists. Employers generally prefer to hire high school graduates who can type at least 50-60 words per minute. Good spelling, punctuation, and grammar are important skills. Most typists learn their skills in high school, or take courses lasting several months at public or private vocational schools. Community and junior colleges also offer the business courses needed for a typist job.

Employment, 1976	1,000,000
Projected employment, 1985	1,200,000
Percent growth, 1976-85	21.8
Average annual openings, 1976-85	63,000
Growth	24,000
Replacement	39,000
Available training data:	
Public vocational education completions	114,182
Private vocational education completions	6,900
Job Corps completions	1,123

Computer and related occupations

Computer operating personnel. High school graduation is the minimum educational requirement for computer operating jobs such as keypunch operator, auxiliary equipment operator, and console operator. Many employers prefer console operators who have some college education. Beginners usually are trained on the job; the length of training varies. Auxiliary equipment operators can learn their jobs in a few weeks, but console operators require several months of training before they are sufficiently familiar with the equipment to be able to trace the causes of breakdowns.

Formal computer training is desirable because most employers look for applicants who already are skilled in operating data entry equipment or computer consoles. Many high schools, vocational schools, computer and business schools, and community and junior colleges offer computer training.

Employment, 1976	565,000
Projected employment, 1985	540,000
Percent change, 1976-85	-4.0
Average annual openings, 1976-85	8,500
Decline	-2,300
Replacement	10,800
Available training data:	
Public vocational education completions	10,625
Private vocational education completions	11,000
Job Corps completions	[1] 282
Junior college graduates	[1] 4,441

[1] Includes training for keypunch and other input technologies, computer operators and peripheral equipment operators, and general data processing workers.

Programmers. There are no universal training requirements for programmers because employers' needs vary. Some require college graduates; others do not. Firms that use computers for scientific or engineering applications usually require programmers to have a bachelor's degree with a major in the physical sciences, mathematics, engineering, or computer science. Some of these jobs require a graduate degree. In firms that use computers for business applications, experience in inventory control, payroll, or accounting often is more important than a college degree. Nonetheless, these firms usually prefer applicants who have had courses in data processing or programming.

Public and private vocational schools, high schools, community and junior colleges, and colleges and universities teach computer programming. Instruction ranges from introductory courses to advanced courses at the graduate level.

Employment, 1976	230,000
Projected employment, 1985	290,000
Percent growth, 1976-85	27.4
Average annual openings, 1976-85	9,700
Growth	7,000
Replacement	2,700

Available training data:

Public vocational education completions	9,909
Private vocational education completions	3,200
Junior college graduates	2,547

Degrees in computer and information sciences:

Bachelor's degrees	5,652
Master's degrees	2,603
Doctor's degrees	244

Systems analysts. No one way of preparing for a job as a systems analyst exists because employers' preferences depend on the type of work done in the firm. Generally, however, a bachelor's degree is the minimum educational requirement. For a job with a bank, insurance company, or business firm, a college degree in accounting, business, or economics is appropriate. For work in a scientific or technical organization, applicants need a degree in the physical sciences, mathematics, engineering, or computer science. In addition to the bachelor's degree in a suitable field, some employers prefer applicants who have work experience in that field. Others require a graduate degree. A growing number of employers seek applicants who have a degree in computer science, information science, or data processing. Regardless of college major, most employers look for people who are familiar with programming languages. Courses in computer concepts, systems analysis, and data retrieval techniques offer good preparation for a job in this field.

In addition, most employers prefer applicants who have some experience in computer programming. Because of the importance of programming experience, many who begin as programmers are promoted to analyst trainees. Employers, computer manufacturers, and colleges and universities offer formal training in systems analysis.

Because technological advances occur so rapidly in the computer field, continuous study is required to keep one's skills up to date. Usually employers and software vendors offer 1- and 2-week courses. An indication of experience and professional competence is the Certificate in Data Processing (CDP), conferred by the Institute for Certification of Computer Professionals upon candidates who have completed five years' experience and passed a 5-part examination.

Employment, 1976	160,000
Projected employment, 1985	210,000
Percent growth, 1976-85	32.9
Average annual openings, 1976-85	7,600
Growth	5,800
Replacement	1,800

Available training data:

Degrees in systems analysis:

Bachelor's degrees	89
Master's degrees	87
Doctor's degrees	3

Banking occupations

Bank clerks. These workers are trained on the job, and generally learn their skills in just a few days or weeks. A high school diploma is not absolutely required, but definitely is preferred. High school or vocational school courses in bookkeeping, typing, business arithmetic, and office machine operation are useful.

Employment, 1976	456,000
Projected employment, 1985	615,000
Percent growth, 1976-85	34.5
Average annual openings, 1976-85	36,000
Growth	17,500
Replacement	18,500
Available training data	

Bank officers and managers. These positions generally are filled by hiring and promoting management trainees, although outstanding bank clerks or tellers may be promoted to trainee jobs and then to management positions. A bachelor's degree is the minimum educational requirement for management trainees. A major in banking and finance is useful, but liberal arts graduates who have had courses in accounting, economics, and statistics also are well qualified. Some banks prefer to hire persons who have graduate degrees for trainee positions; the most desirable degree is the Master of Business Administration. Bank clerks and tellers who are promoted to management trainee positions usually are not college graduates. Often, however, they have taken home study courses in subjects related to banking, such as finance and commercial credit, offered by the American Bankers Association.

In-house training programs for bank officers generally last from 6 months to 1 year. Trainees usually rotate among all the departments in the bank, and are encouraged to continue their education through courses offered by local colleges and universities, or through the American Bankers Association.

Employment, 1976	319,000
Projected employment, 1985	465,000
Percent growth, 1976-85	45.8
Average annual openings, 1976-85	28,000
Growth	16,000
Replacement	12,000

Available training data:

Degrees in banking and finance:

Bachelor's degrees	7,091
Master's degrees	2,414
Doctor's degrees	41

Bank tellers. These workers learn their skills on the job. Generally, banks prefer to hire high school graduates who have some experience in office work. Prior experience is important because employers look for applicants who have the maturity and tact to deal with customers. High school courses in typing, mathematics, and office machine operation are useful. Because tellers handle large amounts of money, applicants must be bonded (which requires good character references).

Employment, 1976	310,000
Projected employment, 1985	405,000
Percent growth, 1976-85	30.0
Average annual openings, 1976-85	21,000
Growth	10,500
Replacement	10,500
Available training data	

Insurance occupations

Actuaries. A bachelor's degree with a major in mathematics or statistics provides a good background for a beginning job in a large life or casualty company; a degree in actuarial science is even better. Some companies hire applicants who have an economics or business administration major, provided they have a thorough foundation in calculus, probability, and statistics. Other useful courses are insurance law, economics, and accounting. Although only 25 colleges and universities offer a degree in actuarial science, several hundred schools offer a degree in mathematics or statistics.

It usually takes from five to ten years after beginning an actuarial career to complete the entire series of examinations required for full professional status. Applicants who pass the first two examinations while still in college usually have an advantage in competing for actuarial jobs upon graduation. The advanced examinations require extensive home study and on-the-job experience.

Employment, 1976	9,000
Projected employment, 1985	11,400
Percent growth, 1976-85	26.7
Average annual openings, 1976-85	500
Growth	250
Replacement	250
Available training data	

Claim representatives. A growing number of insurance companies prefer to hire college graduates for positions as claim representatives (examiners and adjusters). Although courses in insurance, economics, or other business subjects are helpful, a major in almost any field is acceptable. An adjuster who has a business or accounting major might specialize in handling claims for losses due to business interruption or damage to merchandise. Someone who has a degree in industrial engineering might adjust industrial claims. College training is not always necessary, however. Persons experienced in automobile repair work might be hired as auto adjusters, and those who have clerical work experience might get jobs as inside adjusters.

Newly hired claim representatives are trained on the job under the supervision of an experienced worker. The Insurance Institute of America offers a six-semester program leading to a diploma in insurance loss and claim adjusting upon successful completion of six examinations. Adjusters can prepare for these examinations through home study or classroom courses.

The Life Office Management Association (LOMA), in cooperation with the International Claim Association, offers a claims education program for life and health examiners. The program is part of the LOMA Institute Insurance Education Program leading to the professional designation, FLMI (Fellow, Life Management Institute) upon successful completion of eight written examinations.

About three-fourths of the States require adjusters to be licensed. State licensing requirements vary, but applicants usually must complete an approved course in insurance or loss adjusting, and pass a written examination. They should be bonded (which requires good character references) and be at least 20 years old.

Employment, 1976	155,000
Projected employment, 1985	190,000
Percent growth, 1976-85	21.8
Average annual openings, 1976-85	7,700
Growth	3,800
Replacement	3,900
Available training data	

Underwriters. A bachelor's degree is the minimum educational requirement for beginning underwriting jobs in most insurance companies. Applicants who have degrees in business administration or liberal arts are preferred, but college training in almost any field is acceptable. In some companies, high school graduates who have experience as underwriting clerks are trained as underwriters. Independent study programs, which often are required for advancement in underwriting, are available through the American Institute of Property and Liability Underwriters, the American College of Life Underwriters, the Academy of Life Underwriters, the Health Insurance Association of America, and the Life Office Management Association.

The following estimates represent combined data for insurance agents, brokers, and underwriters.

Employment, 1976	490,000
Projected employment, 1985	580,000
Percent growth, 1976-85	18.6
Average annual openings, 1976-85	27,500
Growth	10,100
Replacement	17,400
Available training data	

Administrative and related occupations

Accountants. Most large firms require applicants to have a bachelor's degree with a major in accounting or a closely related field, such as business administration or economics. Some prefer applicants who have a master's degree in accounting. Training in accounting also is available in junior and community colleges, business schools, and correspondence schools; however, job opportunities for graduates of these 1- and 2-year programs usually are limited to small accounting and business firms.

All States require certified public accountants (CPA's) to be certified by the State board of accountancy. Individuals receive this designation by passing the CPA examination, which is prepared by the American Institute of Certified Public Accountants, and meeting the education and experience requirements of the State. Three-fourths of the States require CPA candidates to be college graduates, and nearly all of them insist on 2 or more years of public accounting experience.

Employment, 1976	865,000
Projected employment, 1985	1,050,000
Percent growth, 1976-85	21.3
Average annual openings, 1976-85	51,500
Growth	20,500
Replacement	31,000

Available training data:

Junior college graduates	9,374

Degrees in accounting:

	1975-76	Projected 1976-85 (annual average)
Bachelor's degrees	35,806	40,345
Master's degrees	2,730	4,103
Doctor's degrees	55	101

Buyers. Although many buyers have worked their way from stockroom and sales positions, a college degree is increasingly important and may be required in the future. Many colleges, junior colleges, and business schools offer 1- or 2-year programs in marketing and purchasing. Generally, however, employers accept graduates in any field and train them on the job.

Many stores have formal training programs for all management trainees, including buyers. These programs last from 6 to 8 months and combine classroom instruction in merchandising and purchasing with short rotations to various jobs and departments in the store.

Employment, 1976	109,000
Projected employment, 1985	120,000
Percent growth, 1976-85	10.1
Annual average openings, 1976-85	5,700
Growth	1,200
Replacement	4,500
Available training data	

City managers. Although some individuals who have bachelor's degrees in public administration may find employment as city managers, a master's degree in public or business administration is becoming an essential qualification. Workers in this field usually begin as management assistants in positions such as administrative assistant, department head assistant, or assistant city manager. As they gain experience and administrative skills, assistants may advance to more responsible positions or to city manager jobs. Professional advancement usually involves relocating to city manager jobs in progressively larger cities.

Employment, 1976	3,000
Projected employment, 1985	3,900
Percent growth, 1976-85	28.3
Average annual openings, 1976-85	250
Growth	100
Replacement	150
Available training data	

Credit managers. A bachelor's degree usually is required for beginning jobs in credit management. Employers generally prefer applicants who have majored in business administration, economics, or accounting, although some employers hire liberal arts graduates as well. Experience may be substituted for the college degree; some employers accept high school graduates who have had experience in credit collection or in processing credit information.

Employment, 1976	53,000
Projected employment, 1985	60,000
Percent growth, 1976-85	13.2
Average annual openings 1976-85	2,500
Growth	800
Replacement	1,700
Available training data	

Hotel managers and assistants. Although experience and management ability are the most important considerations in selecting hotel managers, employers increasingly prefer college graduates. Formal training in hotel or restaurant management can be helpful, in part because such programs also provide opportunities for part-time or summer job experience and contacts with prospective employers. Many employers prefer applicants who have completed a 4-year college curriculum in hotel and restaurant administration. In 1976, about 30 such programs were offered. Others hire graduates of the hotel training programs offered by some junior and community colleges, vocational schools, and home study (correspondence) schools. Some large hotels have special management trainee programs in which newly hired workers or persons promoted from within rotate among various departments to acquire a thorough knowledge of the hotel's operation.

Employment, 1976	137,000
Projected employment, 1985	150,000
Percent growth, 1976-85	9.6
Average annual openings, 1976-85	7,000
Growth	1,500
Replacement	5,500

Available training data:

Public vocational education completions	3,022
Degrees in hotel and restaurant management:	
Junior college graduates	1,865
Bachelor's degrees	1,499
Master's degrees	64

Lawyers. In all States, admission to the bar is required before an individual can practice law. To qualify for the bar examination, most States require 4 years of college followed by 3 years of law school. Four years of study usually are required to complete a night school law curriculum.

Although formal training takes place in law school, the courses one selects as an undergraduate are important because there is no "prelaw major." Students should choose courses that develop and expand their reading, writing, verbal, and analytical skills. College majors in the social sciences, natural sciences, or humanities are particularly suitable. Competition for admission to law school is intense, and as is true for other professional schools, law schools vary widely in quality and reputation. Graduates will find that their standing in the graduating class and the stature of the school they attended are important to prospective employers.

Unless a significant change occurs in enrollment trends, the current oversupply of law school graduates can be expected to continue. It is anticipated that about 23,400 new lawyers will be needed annually between 1976 and 1985. The National Center for Education Statistics projections indicate that an average of about 34,000 law students will graduate each year. Not all law school graduates pass the bar examination and seek to practice law, however. In the past, either by choice or because of job market conditions, some have entered politics, public administration, business, and other fields. Many future law school graduates may have to find employment in these other occupations.

Employment, 1976	396,000
Projected employment, 1985	490,000
Percent growth, 1976-85	25.0
Average annual openings, 1976-85	23,400
Growth	10,400
Replacement	13,000

Available training data:

	1975-76	Projected 1976-85 (annual average)
Law school graduates[1]	32,293	33,838

[1] Includes L.L.B. and J.D. degrees.

Personnel and labor relations workers. A bachelor's degree is the minimum educational background for a beginning job in personnel work—a field which includes occupations such as recruiter, interviewer, job analyst, position classifier, wage administrator, training specialist, and employee counselor. Some employers look for college graduates who have majored in personnel administration, public administration, business, or economics, while others prefer applicants who have a liberal arts background. Graduate study in industrial relations, economics, business, or law usually is required for labor relations jobs. The combination of a law degree plus a master's in industrial relations is increasingly desirable for people seeking to enter the small and highly competitive labor relations field. Experience is important, too, and some workers gain essential experience in personnel work and then switch to labor relations. While at least 200 colleges and universities offer programs leading to a bachelor's degree in personnel and labor relations, only 30 schools offer the master's degree in labor or industrial relations.

Employment, 1976	335,000
Projected employment, 1985	450,000
Percent growth, 1976-85	34.9
Average annual openings, 1976-85	23,000
Growth	13,000
Replacement	10,000

Available training data ....

Public relations workers. A bachelor's degree in journalism, communications, or public relations usually is the preferred educational background for beginning jobs. Some employers seek college graduates who have a degree in a scientific or technical field, plus communications skills. Experience can be very important in getting a job, and many employers prefer applicants who have media or journalism experience.

Some companies that have large public relations staffs have formal training programs for new workers. The Public Relations Society of America accredits those who have passed a comprehensive examination and worked at least 5 years' in the field.

Employment, 1976	115,000
Projected employment, 1985	150,000
Percent growth, 1976-85	30.5
Average annual openings, 1976-85	8,300
Growth	3,900
Replacement	4,400

Available training data ....

Purchasing agents. A college degree is required for a beginning position with a large company. Many companies hire business administration or liberal arts majors for trainee positions, but firms that manufacture machinery or chemicals generally prefer applicants who have a science or engineering degree. A growing number of large companies look for applicants who have a master's degree in purchasing management or a related field. Some small firms select purchasing agents from their own staff, and do not require a college degree.

Continuing education is essential for career advancement. Purchasing agents are encouraged to participate in seminars sponsored by professional societies and to take courses in purchasing at local colleges and universities. The recognized mark of experience and professional competence in private industry is the designation Certified Purchasing Manager (CPM), conferred by the National Association of Purchasing Management upon candidates who have passed four examinations and meet educational and experience requirements. In government agencies, the mark of professional competence is the Certified Public Purchasing Officer (CPPO), conferred by the National Institute of Governmental Purchasing upon persons who have passed two examinations and meet educational and experience requirements.

Employment, 1976	192,000
Projected employment, 1985	260,000
Percent growth, 1976-85	34.9
Average annual openings, 1976-85	13,800
Growth	7,400
Replacement	6,400
Available training data	

Urban planners. The master's degree in planning is the usual requirement for jobs at the entry level. There are some beginning jobs, however, for which a bachelor's degree in city planning, architecture, landscape architecture, engineering, or other closely related fields is acceptable. A master's degree is essential for advancement in most jobs.

Employment, 1976	16,000
Projected employment, 1985	23,000
Percent growth, 1976-85	46.5
Average annual openings, 1976-85	1,100
Growth	800
Replacement	300

Available training data:

Degrees in city, community, and regional planning:

Bachelor's degrees	448
Master's degrees	1,411
Doctor's degrees	51

Service Occupations

Cleaning and related occupations

Building custodians. Most building custodians are trained on the job. A high school diploma is not required, as a rule, but workers should know simple arithmetic and read well enough to follow written instructions. High school shop courses are helpful because minor plumbing or carpentry may be part of the job. Training in custodial skills is available through government training programs and labor unions.

Employment, 1976	2,100,000
Projected employment, 1985	2,423,000
Percent growth, 1976-85	15.3
Average annual openings, 1976-85	160,000
Growth	35,000
Replacement	125,000

Available training data:

Public vocational education completions	3,942
Private vocational education completions	([1])
Job Corps completions	1,077

[1] Less than 50.

Hotel housekeepers and assistants. Employers prefer to hire applicants who are high school graduates. Experience or training in hotel housekeeping also is helpful in getting a job. Courses in housekeeping are offered by several colleges and universities that have programs in hotel administration, and also by junior colleges, vocational schools, and home study (correspondence) schools. Persons who have degrees in institutional housekeeping management or who have taken courses in this area may have the best opportunities to advance to executive housekeeper.

Employment, 1976	17,000
Projected employment, 1985	19,000
Percent growth, 1976-85	11.9
Average annual openings, 1976-85	1,100
Growth	200
Replacement	900

Available training data:

Private vocational education completions	([1])

[1] Less than 50.

Food service occupations

Bartenders. Most bartenders learn their trade on the job. A high school diploma is not required. Experience as a bartender's helper, dining room attendant, waiter, or waitress is good training. Generally, bartenders must be at least 21 years old, and some employers prefer to hire persons who are 25 or older. Some States require bartenders to have health certificates assuring that they are free from contagious diseases. In some instances, bartenders must be bonded.

Employment, 1976	261,000
Projected employment, 1985	310,000
Percent growth, 1976-85	18.8
Average annual openings, 1976-85	17,800
Growth	5,400
Replacement	12,400

Available training data:

Private vocational education completions	[1] 3,800

[1] Includes training completed in all quantity food service occupations.

Cooks and chefs. Most cooks acquire their skills on the job while employed as kitchen helpers, although it is becoming common for cooks to have had high school or post-high school training in food preparation. A few cooks and chefs are trained as apprentices under trade union contracts or employee training programs conducted by large hotels and restaurants. A high school diploma is not required for most beginning jobs; however, employers usually prefer high school graduates and applicants for apprenticeship must be graduates. A few private schools have 2- to 3-year training programs for cooks and chefs. The Armed Forces also are a good source of training and experience in food service work. Persons who wish to become chefs may find courses in business administration helpful since chefs often are responsible for directing the operation of their kitchens, including purchasing supplies, planning menus, and supervising other kitchen staff. Most States require cooks and chefs to have health certificates.

Employment, 1976	1,065,000
Projected employment, 1985	1,350,000
Percent growth, 1976-85	26.6
Average annual openings, 1976-85	79,000
Growth	31,500
Replacement	47,500

Available training data:

Job Corps completions	[1] 1,717
Apprenticeship completions	[1] 548

[1] Includes bakers.

Dining room attendants and dishwashers. These occupations can be learned on the job with very little formal training. A high school diploma is not required, but State laws often require dining room attendants and dishwashers to obtain health certificates.

Employment, 1976	442,000
Projected employment, 1985	545,000
Percent growth, 1976-85	23.3
Average annual openings, 1976-85	22,400
Growth	11,400
Replacement	11,000

Available training data:

Job Corps completions	69

Food counter workers. Most counter workers learn their skills on the job. For counter jobs that require totaling bills and making change, employers prefer persons who are good in arithmetic and have attended high school. A diploma generally is not necessary. Managers of fast-food restaurants often hire high school students as part-time counter workers. State laws often require counter workers to obtain health certificates.

Employment, 1976	421,000
Projected employment, 1985	570,000
Percent growth, 1976-85	35.2
Average annual openings, 1976-85	33,000
Growth	16,500
Replacement	16,500

Available training data:

Job Corps completions	66

Meatcutters. Although many learn their skills informally on the job, most meatcutters complete a 2- to 3-year apprenticeship program. At the end of the training, apprentices are given a meatcutting test which their employers observe. Employers prefer high school graduates. Courses in business arithmetic are helpful in weighing and pricing meat and in making change. Some States require meatcutters to have health certificates showing that they are free of contagious diseases.

Employment, 1976	215,000
Projected employment, 1985	200,000
Percent change, 1976-85	-7.9
Average annual openings, 1976-85	4,900
Decline	-1,900
Replacement	6,800

Available training data:

Job Corps completions	121
Apprenticeship completions	853

Waiters and waitresses. Although most waiters and waitresses learn their skills on the job, some attend special training courses offered by public and private vocational schools and restaurant associations. Employers generally prefer applicants who have had at least 2 or 3 years of high school, and are good in arithmetic. Expensive restaurants that take pride in the quality of service they provide often hire only experienced waiters and waitresses. Restaurants specializing in food of a foreign country may prefer applicants who speak that country's language. State laws often require waiters and waitresses to obtain health certificates.

Employment, 1976	1,260,000
Projected employment, 1985	1,500,000

Percent growth, 1976-85	19.5
Average annual openings, 1976-85	71,000
Growth	27,000
Replacement	44,000

Available training data:

Job Corps completions	69

Personal service occupations

Barbers. Most States require barbers to be licensed. To obtain a license applicants must have graduated from a State-approved barber school, have completed the eighth grade, pass a physical examination, and be at least 16 years old (in some States 18). Nearly all States require a beginner to take an examination for an apprentice license, and then, after 1 or 2 years of work, take a second examination for a license as a registered barber. Many public and private schools and a few vocational schools offer barber training which usually lasts 9 to 12 months. Because most States do not recognize out-of-State training, apprenticeship work, or licenses, persons who wish to become barbers should review the laws of the State in which they wish to work before entering barber school.

Employment, 1976	124,000
Projected employment, 1985	126,000
Percent growth, 1976-85	1.4
Average annual openings, 1976-85	8,100
Growth	200
Replacement	7,900

Available training data:

Public vocational education completions	810
Private vocational education completions	5,000
Job Corps completions	2
Apprenticeship completions	[1] 347

[1] May include some beauticians.

Bellhops and bell captains. Bellhops are trained on the job. Many hotels promote elevator operators to these jobs. Although a high school diploma is not required, it improves chances for promotion to bell captain or to front office clerk. Opportunities for advancement to bell captain are limited, however.

Employment, 1976	16,600
Projected employment, 1985	16,500
Percent change, 1976-85	-0.9
Average annual openings, 1976-85	600
Growth	0
Replacement	600
Available training data	

Cosmetologists. All States require cosmetologists to be licensed. Most States require applicants for a license to pass a physical examination, be at least 16 years old, and have completed the 10th grade. Successful completion of a State-approved cosmetology course is appropriate preparation for taking a State licensing examination. In some States completion of an apprenticeship program can substitute for graduation from cosmetology school but few cosmetologists learn their skills this way. Both public and private vocational schools offer training in cosmetology. A daytime course usually takes 9 months to 1 year; an evening course takes longer. An apprenticeship generally lasts 1 or 2 years.

Employment, 1976	534,000
Projected employment, 1985	625,000
Percent growth, 1976-85	16.7
Average annual openings, 1976-85	30,000
Growth	10,000
Replacement	20,000

Available training data:

Public vocational education completions	18,309
Private vocational education completions	49,400
Job Corps completions	87

Funeral directors and embalmers. All States require embalmers to be licensed. Although licensing standards vary by State, an embalmer generally must be 21, have a high school diploma or its equivalent, graduate from a mortuary science school, serve an internship and pass a State board examination. About half of the States require a year or more of college in addition to training in mortuary science.

About half of all mortuary science programs are offered by private vocational schools and last 1 year. The others are offered by colleges and junior colleges. Most of these programs are 2 years in length, although a few last 4 years. Internships are 1 to 2 years in length and may be served before, during, or after one attends mortuary school depending on State regulations.

All but six States also require funeral directors to be licensed. The requirements are similar to those for embalmers, but directors have special internship training and board examinations. Most people obtain both licenses.

Employment, 1976	45,000
Projected employment, 1985	45,000
Percent growth, 1976-85	0.0
Average annual openings, 1976-85	2,200
Growth	0
Replacement	2,200

Available training data:

Public vocational education completions	111
Private vocational education completions	3,800

Private household service occupations

Private household workers. Most household worker jobs require no formal education. Instead, the ability to cook, sew, wash and iron, clean house, and care for children is important. Many necessary skills are learned in the home;

more advanced skills can be learned in home economics courses in high schools, vocational schools, and through government and private training programs.

Employment, 1976	1,125,000
Projected employment, 1985	915,000
Percent change, 1976-85	-18.8
Average annual openings, 1976-85	53,000
Decline	-23,000
Replacement	76,000

Available training data:

Public vocational education completions	94,247
Private vocational education completions	200

Protective and related service occupations

Correction officers. Most State and local governments prefer individuals who are high school graduates and are at least 21 years old. Many require applicants to pass a physical examination and meet standards of height, weight, vision, and hearing. Some State and local governments require applicants to qualify through a written examination that tests general intelligence. Although some correction officers attend training academies, most are trained on the job. Areas covered during their training include institutional policies and regulations, inmate behavior, custody procedures, report writing, and security.

Employment, 1976	90,000
Projected employment, 1985	105,000
Percent growth, 1976-85	16.9
Average annual openings, 1976-85	8,900
Growth	1,700
Replacement	7,200

Available training data ....

Firefighters. In most communities, qualifying examinations are open to high school graduates who are at least 18. Those who score the highest on these examinations, which test intelligence, strength, stamina, and agility, have the best chances for appointment. Experience as a volunteer firefighter or in the Armed Forces may help chances for appointment, too. Beginners in large fire departments generally are trained for several weeks at the city's fire school before assignment to local fire companies. Small communities either train firefighters on the job or hire experienced workers. Additional study can be valuable in preparing for promotion examinations. Fire departments frequently conduct training programs, and vocational schools offer courses in fire and fire safety technology. Many colleges and universities offer courses in fire engineering and fire science.

Employment, 1976	210,000
Projected employment, 1985	260,000
Percent growth, 1976-85	21.1
Average annual openings, 1976-85	8,300
Growth	5,000
Replacement	3,300

Available training data:

Junior college graduates	3,234

Guards. Employers prefer high school graduates; applicants who have not completed high school may be tested for their ability to read, write, and follow written and oral instructions. Police experience gained in the Armed Forces or in State or local police departments is helpful. Most newly hired guards receive on-the-job training combined with formal instruction that covers areas such as the use of firearms, first aid, emergency procedures, and security problems.

Employment, 1976	500,000
Projected employment, 1985	680,000
Percent growth, 1976-85	36.3
Average annual openings, 1976-85	63,000
Growth	20,000
Replacement	43,000

Available training data:

Job Corps completions	6

Police officers. Most large cities and many smaller communities fill police jobs by competitive examination. Candidates usually must be at least 21 years old, high school graduates, in good health, and must meet height, weight, hearing, and vision requirements. Police departments in some large cities generally require 1 or more years of college, and a growing number of police departments hire students majoring in law enforcement as police interns. Some small cities may consider applicants who have not finished high school.

Small communities often train police officers on the job; large cities have formal training at a police academy for a few weeks or several months. Training usually includes instruction in laws and ordinances, civil rights, investigation techniques, traffic control, self-defense, use of firearms, and first aid.

Employment, 1976	500,000
Projected employment, 1985	700,000
Percent growth, 1976-85	40.4
Average annual openings, 1976-85	32,500
Growth	22,800
Replacement	9,700

Available training data:

Private vocational education completions	100
Junior college graduates	[1] 18,698

[1] May include some State police officers.

State police officers. State civil service regulations govern the appointment of State police officers; a competitive examination generally is required. In most States, the examination is open to high school graduates, or to persons who have an equivalent combination of education and experience. State police officers must be at least 21, in good health, and must meet height, weight, hearing, and vision standards. Tests of strength and agility often are required. The character and background of candidates usually are investigated. In some States, high school graduates who are under 21 may enter State police work as cadets. They attend classes, are assigned nonenforcement duties, and, if they qualify, may be appointed officers at age 21.

In all States recruits must enter a formal training program for several months of classroom instruction in topics such as State laws and jurisdictions, traffic control, and accident investigation. Recruits also learn self-defense, use of firearms, driving techniques, and first aid.

High school and college courses in English, government, psychology, sociology, and physics are useful. Physical education and sports develop stamina and agility. Driver education courses and military police training also are helpful.

Employment 1976	48,000
Projected employment, 1985	57,000
Percent growth, 1976-85	20.6
Average annual openings, 1976-85	1,900
Growth	1,100
Replacement	800

Available training data:

Private vocational education completions	(1)
Junior college graduates	(1)

[1] See Police officers.

Construction inspectors (government). These workers receive most of their training on the job. Generally, applicants must have several years of experience as a construction contractor, supervisor, or craftworker. Previous experience as an electrician, plumber, pipefitter, or carpenter is particularly helpful. A high school diploma is required by Federal, State, and most local governments. Many employers prefer inspectors to be graduates of an apprenticeship program or to have had college courses in architecture, engineering, mathematics, or construction technology. Periodic retraining is necessary to keep abreast of changes in technology, building codes, and related areas.

Employment, 1976	22,000
Projected employment, 1985	30,000
Percent growth, 1976-85	36.4
Average annual openings, 1976-85	2,300
Growth	900
Replacement	1,400

Available training data ....

Health and regulatory inspectors (government). Because inspectors perform a wide range of duties, qualifications for employment vary. The Federal Government requires a passing score on the Professional and Administrative Career Examination (PACE) for several occupations, including immigration, customs, occupational safety, and consumer safety inspectors. To take the examination, a bachelor's degree or 3 years of responsible work experience are required. Other Federal inspectors must pass an examination based on specialized knowledge, in addition to having work experience in a related field. Qualifications for inspectors at the State and local level usually are similar to those for Federal employees. All inspectors are trained in the laws and inspection procedures in their specific field through a combination of classroom and on-the-job training.

Employment, 1976	115,000
Project employment, 1985	145,000
Percent growth, 1976-85	27.4
Average annual openings, 1976-85	7,900
Growth	3,500
Replacement	4,400

Available training data:

Junior college graduates	460

Other service occupations

Mail carriers. These workers are trained on the job. Applicants must be at least 18 except for high school graduates, who must be at least 16. They also must pass an examination that tests clerical accuracy and the ability to read, do simple arithmetic, and memorize mail sorting systems. If the job involves driving, an applicant must have a driver's license and pass a road test. Applicants also must pass a physical examination and may be asked to show that they can handle mail sacks weighing up to 70 pounds.

Employment, 1976	250,000
Projected employment, 1985	250,000
Percent change, 1976-85	-0.4
Average annual openings, 1976-85	5,300
Growth	0
Replacement	5,300

Available training data ....

Telephone operators. New operators are trained on the job. Instruction and practice usually last from 1 to 3 weeks, and then operators are assigned to regular operator jobs and receive further instruction from supervisors. PBX operators may have a somewhat shorter training period than telephone company operators. High school graduation is required, and courses in speech, office practices, and business arithmetic are helpful.

Employment, 1976	340,000
Projected employment, 1985	330,000
Percent change, 1976-85	-3.0
Average annual openings, 1976-85	11,600
Decline	-1,100
Replacement	12,700

Available training data:

Job Corps completions	25

Education and Related Occupations

Teaching occupations

Kindergarten and elementary school teachers. All States require public elementary school teachers to be certified, and some States also require certification of elementary teachers in private and parochial schools. To become certified, an individual must have a bachelor's degree from an institution with a State-approved teacher education program. Student teaching and basic education courses also are required. In 1976, 14 States required teachers to obtain supplementary postgraduate education – usually a master's degree or a fifth year of study – after their initial certification. Some States demand U.S. citizenship, some an oath of allegience, and several a health certificate. Local school systems sometimes have additional requirements.

Kindergarten and elementary school teachers are expected to face competition for jobs of their choice through the mid-1980's. The primary source of teacher supply is new degree recipients. The National Center for Education Statistics projects an average of about 1 million new bachelor's degrees to be awarded annually over the 1976-85 period, although not all graduates will be qualified to teach in elementary schools. On the basis of recent trends, it is anticipated that an average of 119,000 graduates will be prepared to teach each year. Of these, 99,000 are expected to actively seek teaching positions.

Teachers who have left the labor force and certified teachers who did not enter the labor force after graduation also are sources of supply. However, the number of prospective entrants from these sources is influenced by factors which cannot be projected with accuracy, such as the availability of teaching jobs relative to other jobs, and salaries of teachers relative to other occupations. Despite the problem of estimating future supply, there is every indication that the potential supply will exceed the average annual openings over the 1976-85 period. As a result, an increasing proportion of new college graduates certified to teach in elementary schools, as well as delayed entrants and reentrants, may have to seek employment in other occupations.

Employment, 1976	1,364,000
Projected employment, 1985	1,498,000
Percent growth, 1976-85	9.8
Average annual openings, 1976-85	70,000
Growth	15,000
Replacement	55,000

Available training data:

New college graduates prepared to teach in elementary schools in 1976	[1] 110,968

[1] National Education Association data.

Secondary school teachers. All States require public secondary school teachers to be certified, and some States also require certification of secondary teachers in private and parochial schools. To become certified, an individual must have a bachelor's degree from an institution with a State-approved teacher education program. Student-teaching and basic education courses also are required. In 1976, the District of Columbia required a master's degree for initial certification, and 14 States required a fifth year of study, or a master's degree, within a specified time after beginning work. Some States demand U.S. citizenship, some an oath of allegiance, and several a health certificate. Local school systems sometimes have additional requirements.

The supply of secondary school teachers is expected to greatly exceed the available number of openings through the mid-1980's if past trends of entry into the profession continue. The number of teaching positions is projected to decline during this period as enrollment in secondary schools declines. The largest source of secondary teachers is new degree recipients. The National Center for Education Statistics projects an average of about 1 million new bachelor's degrees to be awarded annually over the 1976-85 period, although not all graduates will be qualified to teach in secondary schools. On the basis of recent trends, it is anticipated that about 156,000 graduates will be prepared to teach each year. Of these, 108,000 are expected to actively seek teaching positions.

Teachers who have left the labor force and certified teachers who did not enter the labor force after graduation also are sources of supply. However, the number of prospective entrants from these sources cannot be projected with accuracy, as it is affected by the availability of teaching jobs relative to other jobs, and salaries of teachers relative to other occupations. Despite the problem of estimating future supply, there is every indication that the potential supply will exceed the expected number of openings. As a result, an increasing proportion of new college graduates certified to teach in secondary schools, as well as delayed entrants and reentrants may have to seek employment in other occupations.

Employment, 1976	1,111,000
Projected employment, 1985	986,000
Percent change, 1976-85	-11.3
Average annual openings, 1976-85	13,000
Decline	-14,000
Replacement	27,000

Available training data:

New college graduates prepared to teach in secondary schools in 1976	[1] 144,931

[1] National Education Association data.

College and university teachers. Most beginning instructor positions require a master's degree in the subject to be taught. A Ph. D. degree generally is preferred, and may be required by some institutions. Advancement to assistant professor, to associate professor, and then to a full professorship requires additional teaching and research experience.

Individuals seeking teaching positions in colleges and universities can expect to face keen competition through the mid-1980's. The National Center for Education Statistics projects an average of about 40,000 Ph. D's to be awarded annually between 1976 and 1985. In the past, more than one-half of all Ph. D. recipients entered college teaching. If this entry rate continues, the supply of Ph. D's alone who are seeking teaching positions could exceed available openings. It appears, therefore, that an increasing proportion of prospective college teachers, especially those with master's degrees, will have to seek nonacademic jobs.

Employment, 1976	[1] 593,000
Projected employment, 1985	[1] 610,000
Percent change, 1976-85	2.9
Average annual openings, 1976-85	17,000
Growth	2,000
Replacement	15,000
Available training data	

[1] Does not include part-time junior instructors.

Teacher aides. Requirements vary widely. Some schools hire high school graduates; some do not require a diploma. Others want aides to have some college training or a bachelor's degree. Teacher aides may be trained on the job or through a formal training program. A growing number of junior and community colleges offer teacher aide programs that culminate in an associate degree. When hiring, schools may give preference to individuals who have experience working with children and have the most education. Some schools have regulations regarding the hiring of aides. Applicants may be required to have a family income below a certain level or to be parents of children in the school district. In addition, health regulations may require teacher aides to pass a physical examination.

Employment, 1976	320,000
Projected employment, 1985	495,000
Percent growth, 1976-85	54.4
Average annual openings, 1976-85	29,000
Growth	19,000
Replacement	10,000
Available training data:	
Junior college graduates	5,840

Library occupations

Librarians. A master's degree in library science generally is required to enter the occupation. A Ph. D. degree is an asset for individuals who plan a teaching career or who aspire to a top administrative post, particularly in a college or university library, or in a large library system. Information scientists and special librarians generally need a master's degree or doctorate in the subject area of the specialized library. Most States require public school librarians to be certified both as teachers and librarians. Some States require certification of public librarians; the specific education and experience necessary vary.

The employment outlook for librarians is expected to be somewhat competitive through the mid-1980's. The National Center for Education Statistics projects that about 9,900 master's degrees in library science will be awarded annually between 1976 and 1985, although not all graduates will seek entry into the profession immediately upon graduation. If past trends continue, an average of about 7,900 master's degree recipients will seek librarian positions annually. In addition, a smaller number of bachelor's and Ph. D. degree recipients also will seek these jobs. Many qualified librarians outside the labor force who have not worked in the field or who have left the field are expected to seek entry or reentry to the profession also. Yet another source of supply is persons who have degrees in education with a specialization in librarianship or audiovisual technology. Although data on entrants from these sources are limited, it is anticipated that the number of people seeking to enter or reenter the field may exceed openings, and some may have to find employment in other occupations.

Employment, 1976	128,000
Projected employment, 1985	145,000
Percent growth, 1976-85	13.3
Average annual openings, 1976-85	8,000
Growth	2,000
Replacement	6,000
Available training data:	
Degrees in library science:	
Bachelor's degrees	843
Master's degrees	8,037
Doctor's degrees	71

Library technicians and assistants. These workers may receive training either on the job or in a formal post-high school program. Some libraries require only graduation from high school for library clerks, who, after a few years of training on the job, may advance to technician positions. Other libraries hire only technicians who have formal training.

In 1976, 120 institutions, mostly 2-year colleges, offered this training. Programs usually consist of a year of liberal arts courses and a year of library-related study and culminate in an associate of arts degree in library technology.

Employment, 1976	143,000
Projected employment, 1985	168,000
Percent growth, 1976-85	17.5
Average annual openings, 1976-85	8,300
Growth	2,800
Replacement	5,500
Available training data:	
Job Corps completions	1
Junior college graduates	594

Sales Occupations

Automobile parts counter workers. These workers learn on the job, usually beginning as helpers to experienced employees. Generally 2 years of work experience are needed before a person becomes thoroughly familiar with most types of parts and accessories. Employers usually prefer to hire high school graduates. High school or vocational school courses in auto mechanics, commercial arithmetic, selling, and bookkeeping are helpful. Practical work experience in a gasoline station or automobile repair shop also is an asset.

Employment, 1976	75,000
Projected employment, 1985	97,000
Percent growth, 1976-85	27.5
Average annual openings, 1976-85	4,200
Growth	2,300
Replacement	1,900
Available training data:	
Job Corps completions	63

Automobile sales workers. Most beginners are trained on the job, although large dealers sometimes provide formal classroom training. Many employers require beginning sales workers to be at least 21 years old and high school graduates. Courses in public speaking, commercial arithmetic, psychology, business law, and selling are useful. Appropriate personal characteristics, such as a pleasant appearance, an outgoing personality, and the ability to inspire confidence, also are important. Previous sales experience or other work involving contact with the public is desirable.

Employment, 1976	130,000
Projected employment, 1985	160,000
Percent growth, 1976-85	23.1
Average annual openings, 1976-85	9,000
Growth	3,900
Replacement	5,100
Available training data	

Automobile service advisors. These workers are trained on the job. Trainees usually are selected from among personnel already employed in the organization. For example, an experienced mechanic or parts counter worker may be selected. Generally, 1 to 2 years of training are needed before a new service advisor can handle all aspects of the job. A high school diploma is preferred but not required. Because the job involves close contact with customers and mechanics in the shop, personal characteristics, such as an ability to deal with customer complaints and communicate clearly, are important.

Employment, 1976	24,000
Projected employment, 1985	27,000
Percent growth, 1976-85	15.6
Average annual openings, 1976-85	1,000
Growth	400
Replacement	600
Available training data	

Gasoline service station attendants. These workers are trained on the job. A high school diploma usually is not required and students often are hired for these jobs. Attendants who wish to become station managers need a diploma, however, to participate in service station management programs conducted by oil companies. Applicants for attendant jobs should have a driver's license, a general understanding of how an automobile works, and some sales ability.

Employment, 1976	420,000
Projected employment, 1985	470,000
Percent growth, 1976-85	12.6
Average annual openings, 1976-85	14,800
Growth	5,800
Replacement	9,000
Available training data:	
Job Corps completions	74

Insurance agents and brokers. Many employers prefer college graduates for insurance sales workers. Degrees in almost any field are acceptable, but applicants who have studied accounting, economics, finance, business law, or insurance are preferred. Because success in selling greatly depends on personal qualities such as aggressiveness and self-confidence, employers look for these traits. Some employers hire experienced individuals who have these characteristics, whether or not they have attended college.

Newly hired workers usually receive some formal training in insurance regulations, selling, policy writing, and techniques for determining the amount of insurance policyholders require. Trainees may attend company-sponsored classes or courses at local colleges and universities. Home study (correspondence) courses also are available.

Many sales workers take courses offered by insurance organizations. The Life Underwriter Training Council (LUTC) awards a diploma in life insurance marketing to agents who successfully complete the Council's 2-year life program; there also is a course in health insurance. As agents and brokers gain experience and knowledge, they can qualify for the Chartered Life Underwriter (CLU) designation by passing a series of examinations given by the American College of Bryn Mawr, Pennsylvania. Property-liability agents can qualify for the Chartered Property Casualty Underwriter (CPCU) designation by passing a series of examinations given by the American Institute for Property and Liability Underwriters. The CLU and CPCU designations are recognized marks of achievement in their respective fields.

All agents and most brokers must be licensed in the State where they sell insurance. Most States require candidates for a license to pass a written examination in insurance fundamentals and State insurance laws.

Data for insurance agents and brokers are combined with data on underwriters.

Employment, 1976	490,000
Projected employment, 1985	580,000
Percent growth, 1976-85	18.6
Average annual openings, 1976-85	27,500
Growth	10,100
Replacement	17,400
Available training data	

Manufacturers' sales workers. Employers generally prefer to hire college graduates for these positions. A bachelor's degree in liberal arts or in business administration is good preparation for selling non-technical products. Industrial manufacturers look for applicants who have degrees in science or engineering, and pharmaceutical companies usually prefer persons who have studied pharmacy.

Newly hired sales workers may receive specialized training before they start on the job. Some companies, especially those that manufacture complex technical products, have formal training programs that last 2 years or longer. Other firms offer classroom instruction followed by additional training under the supervision of field managers.

Employment, 1976	362,000
Projected employment, 1985	417,000
Percent growth, 1976-85	15.1
Average annual openings, 1976-85	17,600
Growth	6,000
Replacement	11,600
Available training data	

Real estate agents and brokers. All States require real estate agents and brokers to be licensed. To obtain a license as an agent, an individual must be a high school graduate, be at least 18 years old, and pass a written test. Many large firms prefer to hire college graduates. However, most employers consider personality traits as important as academic training and seek applicants who have maturity, tact, and sales ability.

Most States require candidates for the general sales license to have completed 30 hours of classroom instruction in the fundamentals and legal aspects of real estate transactions. Courses to prepare candidates for the real estate sales examination are offered in high schools, vocational schools, and colleges and universities. Many real estate firms offer these preparatory courses and some periodically offer continuing education courses for their experienced sales workers. In addition, many community and junior colleges and 4-year colleges and universities offer courses and programs leading to associate, bachelor's or advanced degrees in real estate. Courses in areas such as mortgage financing, real estate appraisal, and real estate management are offered to experienced salesworkers through affiliates of the National Association of Realtors.

Most States require candidates for the real estate broker's license to have completed 90 hours of classroom instruction in real estate and have 1-3 years of experience selling real estate.

Employment, 1976	450,000
Projected employment, 1985	575,000
Percent growth, 1976-85	27.5
Average annual openings, 1976-85	45,500
Growth	13,800
Replacement	31,700
Available training data:	
Public vocational education completions	17,452
Private vocational education completions	21,200

Retail trade sales workers. Most sales workers learn their skills on the job. In large stores, training programs for newly hired workers usually begin with several days of classroom instruction, followed by on-the-job training under the supervision of an experienced worker. In small stores, an experienced worker, or in some cases the proprietor, trains new sales workers. Employers prefer to hire high school graduates, and courses in commercial arithmetic and merchandising provide a good background. Thousands of high schools also offer distributive education programs that allow students to work part-time at local stores while taking courses in merchandising, accounting, and other aspects of retailing. Some programs are intended for adults as well, and offer training for persons beginning their careers or seeking advancement.

Employment, 1976	2,725,000
Projected employment, 1985	3,000,000
Percent growth, 1976-85	10.2
Average annual openings, 1976-85	155,000
Growth	31,000
Replacement	124,000
Available training data:	
Public vocational education completions	[1] 4,955
Job Corps completions	74

[1] Includes training for other occupations in retail trade.

Route drivers. Although some large companies have classes in sales techniques, most route drivers are trained on the job. Employers generally prefer applicants who are high school graduates and have good driving records. Most States require route drivers to have a chauffeur's license.

Employment, 1976	200,000
Projected employment, 1985	194,000
Percent change, 1976-85	-3.6
Average annual openings, 1976-85	3,400
Decline	-800
Replacement	4,200
Available training data	

Securities sales workers. Employers generally prefer to hire college graduates as sales workers and consider a degree in business administration, economics, finance, or liberal arts good preparation for the job. Employers look for individuals who are well-groomed, able to motivate others, ambitious, and self-starters. Successful sales or managerial, experience is particularly helpful. Almost all States require securities sales workers to be licensed; a personal bond is required and applicants must pass a written test. In addition, practically all sales workers must be registered representatives of their firms according to the regulations of the securities exchanges through which they do business, or the National Association of Securities Dealers. Examinations and character investigations are required for registration.

Most employers provide training to help newly hired salesworkers meet the requirements for registration. Depending on the size of the firm, this initial training varies from short informal programs to combined classroom instruction and on-the-job experience lasting 6 months or more.

Employment, 1976	90,000
Projected employment, 1985	105,000
Percent growth, 1976-85	15.4
Average annual openings, 1976-85	5,500
Growth	1,600
Replacement	3,900
Available training data	

Travel agents. Although no specific educational background is required, some employers prefer to hire college graduates for these jobs. Useful experience may be gained by working as a reservation clerk or receptionist in a travel agency or as an airline reservation or ticket agent. Correspondence schools provide a basic understanding of the travel industry. High school courses in geography, history, and foreign languages can be helpful.

Employment, 1976	15,000
Projected employment, 1985	22,000
Percent growth, 1976-85	46.7
Average annual openings, 1976-85	1,400
Growth	800
Replacement	600
Available training data	

Wholesale trade sales workers. Employers generally require applicants to be high school graduates, although college training is becoming a requirement for an increasing number of these jobs. The background a sales worker needs depends mainly upon the product line and the market. Selling certain products, such as pharmaceuticals, may require a background in chemistry, biology, or pharmacy, for example. High school graduates may begin in a nonselling job and work their way up or may be hired as sales trainees. In either case, beginners usually work in several types of nonselling jobs, such as stock clerk or shipping clerk, before receiving sales training from an experienced sales worker. Learning the job in this way takes about 2 years. College graduates enter the sales force directly out of school. Very large wholesalers offer formal training programs; smaller firms rely on experienced sales workers to instruct trainees.

Employment, 1976	808,000
Projected employment, 1985	945,000
Percent growth, 1976-85	16.9
Average annual openings, 1976-85	41,000
Growth	15,000
Replacement	26,000
Available training data:	
Public vocational education completions	2,170

Construction Occupations

Bricklayers, stonemasons, and marblesetters. Most bricklayers learn their trade on the job, usually in 3 to 5 years. But, some bricklayers and most stonemasons and marblesetters learn their skills through a 3-year apprenticeship program that combines on-the-job training with classroom instruction. A high school diploma or its equivalent is usually required by employers for entry into apprenticeship programs. Courses in blueprint reading and shop provide a useful background.

Employment, 1976	175,000
Projected employment, 1985	205,000
Percent growth, 1976-85	17.1
Average annual openings, 1976-85	7,500
Growth	3,300
Replacement	4,200
Available training data:	
Public vocational education completions	[1] 11,468
Private vocational education completions	([2])
Job Corps completions	[1] 671
Apprenticeship completions	[1] 1,407

[1] Also includes tilesetters.

[2] Less than 50.

Carpenters. The recommended way to learn this trade is to complete a 4-year apprenticeship. Most workers learn on the job, however, often by beginning as a helper to experienced carpenters and gradually acquiring skills. It takes much longer to become a skilled carpenter in this way than it does through an apprenticeship. Some knowledge of the trade also may be obtained through vocational school courses in carpentry, shop, mechanical drawing, and mathematics. Employers generally prefer to hire applicants who are high school graduates but a diploma is not required.

Employment, 1976	1,010,000
Projected employment, 1985	1,260,000
Percent growth, 1976-85	24.8
Average annual openings, 1976-85	67,000
Growth	28,000
Replacement	39,000

Available training data:

Public vocational education completions	39,712
Private vocational education completions	200
Job Corps completions	1,959
Apprenticeship completions	6,211

Cement masons and terrazzo workers. Most cement masons learn their trade informally on the job in 2 to 3 years. Others complete a 2- or 3-year apprenticeship program that combines on-the-job training with classroom instruction in subjects such as basic mathematics, blueprint reading, and safety. Employers prefer to hire high school graduates, and courses in mathematics and mechanical drawing provide a useful background.

Employment, 1976	71,000
Projected employment, 1985	120,000
Percent growth, 1976-85	69.0
Average annual openings, 1976-85	7,500
Growth	5,400
Replacement	2,100

Available training data:

Job Corps completions	419
Apprenticeship completions	566

Construction laborers. Most laborers are trained on the job as this work does not require specific skills. Generally, applicants must be at least 18 years old and in good physical condition. An experienced construction laborer can advance to carpenter, bricklayer, cement mason, or other craft occupation.

Employment, 1976	715,000
Projected employment, 1985	900,000
Percent growth, 1976-85	25.9
Average annual openings, 1976-85	40,000
Growth	20,500
Replacement	19,500

Available training data:

Job Corps completions	76

Electricians (construction). Completion of a 4-year apprenticeship that combines on-the-job training with classroom instruction in subjects such as circuits and wiring, fundamentals of electronics, and the National Electrical Code is the recommended way to learn the trade. Many electricians learn their skills on the job, however. Training in some of the skills needed for the occupation also may be acquired through vocational school courses. Employers prefer to hire high school or vocational school graduates who have 1 year of algebra. Courses in electricity, electronics, mechanical drawing, science, and shop provide a good background. Applicants for apprenticeships must be high school graduates. Most cities require electricians to be licensed. To obtain a license applicants must pass a written test and may have to demonstrate their skill.

Employment, 1976	260,000
Projected employment, 1985	320,000
Percent growth, 1976-85	25.5
Average annual openings, 1976-85	13,700
Growth	6,700
Replacement	7,000

Available training data: [1]

Public vocational education completions	15,371
Private vocational education completions	500
Job Corps	604
Apprenticeship completions	6,563

[1] All electricians, including maintenance.

Floor covering installers. Most of these workers learn their skills on the job, usually beginning as helpers to experienced workers. Others qualify through apprenticeship programs that combine on-the-job training with related classroom instruction. The program for floor covering installers lasts 2 to 4 years. Individuals also may learn the basic skills necessary for the trade as part of an apprenticeship in carpentry, tilesetting, bricklaying, or stone and marble setting. Employers prefer to hire high school or vocational school graduates, and courses in general mathematics and shop may be helpful. Applicants for apprenticeships generally must have a high school diploma.

Employment, 1976	85,000
Projected employment, 1985	100,000
Percent growth, 1976-85	20.5
Average annual openings, 1976-85	3,200
Growth	1,900
Replacement	1,300

Available training data:

Apprenticeship completions	283

Glaziers (construction). The majority of these workers learn their trade through a 4-year apprenticeship which combines on-the-job training with classroom instruction in related subjects such as blueprint reading and safety. Others learn on the job and a few pick up the skills while working in another industry where glass is installed, for example, automobile manufacturing. Employers generally prefer to hire high school graduates, and a diploma is required for entry into apprenticeship programs. Courses in mathematics and mechanical drawing are helpful.

Employment, 1976	10,000
Projected employment, 1985	13,000
Percent growth, 1976-85	30.0
Average annual openings, 1976-85	600
Growth	350
Replacement	250

Available training data:

Apprenticeship completions	266

Insulation workers. The majority of these workers learn their trade on the job. Others learn through a 4-year "improvership" program that combines on-the-job training with classroom instruction in areas such as safety and insulation application techniques. The "improvership" program is similar to an apprenticeship. A few insulation workers pick up their skills while working in another trade or in a manufacturing plant where applying insulation is part of their job. Employers prefer to hire high school graduates who are licensed to drive. High school or vocational school courses in blueprint reading and shop mathematics are helpful.

Employment, 1976	30,000
Projected employment, 1985	50,000
Percent growth, 1976-85	66.7
Average annual openings, 1976-85	2,900
Growth	2,200
Replacement	700

Available training data:

Apprenticeship completions[1]	264

[1] "Improvership" and apprenticeship are interchangeable in reference to insulation workers.

Ironworkers (structural, ornamental, and reinforcing ironworkers; riggers; and machine movers). Most workers learn their skills on the job; however, completion of a 3-year apprenticeship program that supplements on-the-job experience with related classroom instruction is recommended. Employers generally prefer to hire high school graduates. Courses in blueprint reading, drafting, and mathematics are helpful. The job requires agility, a good sense of balance, and above-average strength.

Employment, 1976	71,000
Projected employment, 1985	112,000
Percent growth, 1976-85	60.0
Average annual openings, 1976-85	6,500
Growth	4,700
Replacement	1,800

Available training data:

Apprenticeship completions	2,273

Operating engineers (construction machinery operators). Completion of a 3-year apprenticeship program including related classroom instruction is recommended. Learning to operate a variety of machines through apprenticeship or, in some instances, private training schools usually results in better job opportunities. Some operating engineers learn their skills on the job, starting as helpers or oilers and then progressing from operating light equipment to highly complex construction machinery. A few individuals learn their skills in the Armed Forces. Most employers prefer high school graduates, and a diploma may be required for entry into apprenticeship programs. Courses in automobile mechanics are helpful.

Employment, 1976	585,000
Projected employment, 1985	810,000
Percent growth, 1976-85	38.5
Average annual openings, 1976-85	41,000
Growth	25,000
Replacement	16,000

Available training data:

Job Corps completions	633
Apprenticeship completions	945

Painters and paperhangers. Although completion of a 3-year apprenticeship combining on-the-job experience and related classroom instruction is recommended, opportunities are very limited. Informal on-the-job training is available through local contractors, however. A high school education is preferred but not essential. Manual dexterity and good color sense are important assets. Painters and paperhangers should be free of allergies to paints and chemicals used on the job.

Employment, 1976	425,000
Projected employment, 1985	525,000
Percent growth, 1976-85	23.5
Average annual openings, 1976-85	29,400
Growth	11,300
Replacement	18,100

Available training data:

Job Corps completions	708
Apprenticeship completions	1,139

Plasterers. A 3- to 4-year apprenticeship that combines on-the-job training with classroom instruction in subjects such as blueprint reading, tool care, and safety is the recommended way to learn the trade. Many plasterers learn the trade on the job, however, by working as plasterer's helpers or laborers. Employers generally prefer to hire high school graduates. Courses in mathematics, mechanical drawing, and shop are useful.

Employment, 1976	24,000
Projected employment, 1985	25,000
Percent growth, 1976-85	4.7
Average annual openings, 1976-85	900
Growth	100
Replacement	800

Available training data:

Job Corps completions	202
Apprenticeship completions	153

Plumbers and pipefitters. Although many learn their trade informally on the job, completion of a 5-year apprenticeship is recommended. Employers prefer high school graduates. High school or vocational school courses in mathematics, drafting, physics, and chemistry can provide some useful skills. Some localities require workers to be licensed; applicants must pass a written examination.

Employment, 1976	385,000
Projected employment, 1985	535,000
Percent growth, 1976-85	39.0
Average annual openings, 1976-85	30,000
Growth	17,000
Replacement	13,000

Available training data:[1]

Public vocational education completions	6,707
Private vocational education completions	100
Job Corps completions	176
Apprenticeship completions	6,061

[1] Includes sprinkler fitters and steamfitters.

Roofers. The majority of roofers acquire their skills on the job as helpers to experienced workers. Completion of a 3-year apprenticeship that combines on-the-job training with classroom instruction in cutting and applying various roofing materials, blueprint reading, and safety is recommended, however. Employers prefer to hire high school graduates; courses in mechanical drawing and basic mathematics are helpful.

Employment, 1976	90,000
Projected employment, 1985	130,000
Percent growth, 1976-85	44.0
Average annual openings, 1976-85	6,300
Growth	4,400
Replacement	1,900

Available training data:

Apprenticeship completions	482

Sheet-metal workers. Although many workers learn the trade informally on the job, completion of a 4-year apprenticeship program is the recommended way to enter the occupation. These programs combine on-the-job training with classroom instruction in subjects such as sheet-metal drawing and patternmaking, applied mathematics, and blueprint reading. A high school diploma is preferred by employers and required for entry to apprenticeship programs. Courses in mathematics, mechanical drawing, and shop provide a helpful background for learning the trade.

Employment, 1976	65,000
Projected employment, 1985	75,000
Percent growth, 1976-85	15.4
Average annual openings, 1976-85	2,600
Growth	1,100
Replacement	1,500

Available training data:

Public vocational education completions	4,638
Job Corps completions	117
Apprenticeship completions	2,351

Tilesetters. The best way to learn this trade is through a 3-year apprenticeship program, but many workers acquire their skills on the job, working as helpers. When hiring apprentices or helpers, employers usually prefer high school or vocational school graduates who have had courses in mathematics, mechanical drawing, and shop. Good physical condition, manual dexterity, and a good sense of color harmony also are important.

Employment, 1976	36,000
Projected employment, 1985	45,000
Percent growth, 1976-85	25.0
Average annual openings, 1976-85	1,800
Growth	1,000
Replacement	800

Available training data[1] ....

[1] See bricklayers, stonemasons, and marblesetters.

Occupations in Transportation Activities

Air transportation occupations

Air traffic controllers. Trainees are selected through the competitive Federal Civil Service System. Applicants must be not more than 30 years old, pass a written test, and have either 3 years of work experience that demonstrates their potential, or a college degree. Newly hired controllers receive 16 weeks of formal training as well as on-the-job training during which they learn Federal Aviation Administration regulations, operation of their equipment, and performance characteristics of different aircraft. It usually takes 2 to 3 years of experience to learn the job thoroughly.

Employment, 1976	21,000
Projected employment, 1985	28,400
Percent growth, 1976-85	35.8
Average annual openings, 1976-85	1,100
Growth	800
Replacement	300

Available training data ....

Airplane mechanics. Most mechanics learn their job while in the Armed Forces or through 2-year programs offered by trade schools certified by the Federal Aviation Administration (FAA). A few learn on the job. The majority of mechanics who work on civilian aircraft are licensed by the

FAA as "airframe mechanics," "powerplant mechanics," or "aircraft inspectors." Airframe mechanics work on the structural parts of the plane; powerplant mechanics work on the engine. Some mechanics and all aircraft inspectors must have both licenses.

At least 18 months of work experience are required for an airframe or powerplant license; for a combined license, at least 30 months of experience working with both engines and airframes are required. To obtain an inspector's license, a mechanic must have held an airframe-and-powerplant license for at least 3 years. Applicants for all licenses must pass written and oral tests and demonstrate their ability to do the work.

Employers prefer to hire high school graduates. Courses in mathematics, physics, chemistry, and mechanical drawing are helpful.

Employment, 1976	110,000
Projected employment, 1985	138,000
Percent growth, 1976-85	25.5
Average annual openings, 1976-85	5,200
Growth	3,100
Replacement	2,100

Available training data:

Private vocational education completions	1,400
Apprenticeship completions	48

Airplane pilots. Pilots who are paid to transport passengers or cargo must have at least a commercial pilot's license from the Federal Aviation Administration (FAA). To obtain a license, applicants must be at least 18, have at least 250 hours of flight experience, and must pass a strict physical examination. Applicants must pass a written test covering the principles of safe flight, navigation techniques, and FAA regulations. They also must demonstrate their flying ability to FAA examiners. Pilots who have to fly in bad weather also must be licensed to fly by instruments. This license requires 40 hours of experience using instruments, passing a written test, and demonstrating the ability to fly by instruments to an FAA examiner.

Airline pilots must fulfill additional requirements which most new pilots hired as flight engineers have already done. Airline captains must have a transport pilot's license which requires even more flight experience.

Flying can be learned in military or civilian flying schools, but the airlines and many businesses prefer pilots trained in the Armed Forces. Pilots hired by the airlines must be high school graduates; however, most airlines require 2 years of college and prefer to hire college graduates.

Employment, 1976	83,000
Projected employment, 1985	110,000
Percent growth, 1976-85	33.6
Average annual openings, 1976-85	4,100
Growth	3,100
Replacement	1,000

Available training data:

Public vocational education completions	433
Private vocational education completions	20,600

Flight attendants. Most large airlines train their own flight attendants; those that do not operate schools usually send their trainees to another airline's school. Training programs generally last about 5 weeks during which attendants learn flight regulations and how to handle emergencies and how to deal with passengers. Applicants must be high school graduates and individuals who have 2 years or more of college or experience dealing with the public are preferred.

Employment, 1976	42,000
Projected employment, 1985	76,000
Percent growth, 1976-85	79.2
Average annual openings, 1976-85	6,000
Growth	3,700
Replacement	2,300
Available training data	

Reservation, ticket, and passenger agents. Most agents receive a week of classroom instruction and about 3 weeks of on-the-job training during which they learn how to use flight schedule information, book reservations, and deal with customers. A pleasant speaking voice is essential and a high school diploma is required.

Employment, 1976	51,000
Projected employment, 1985	65,000
Percent growth, 1976-85	26.9
Average annual openings, 1976-85	2,900
Growth	1,500
Replacement	1,400
Available training data	

Merchant marine occupations

Merchant marine officers. Candidates must either have acquired at least 3 years of sea experience in the Coast Guard or Navy, or have graduated from the U.S. Merchant Marine Academy, from one of five State merchant marine academies, or from a trade union training program. Candidates also must pass a Coast Guard examination to obtain a license. Usually, applicants who have sea experience but are not graduates of academies must obtain training to pass the examination. A high school diploma is not required.

Employment, 1976	13,300
Projected employment, 1985	15,200
Percent growth, 1976-85	14.6
Average annual openings, 1976-85	600
Growth	200
Replacement	400
Available training data	

Merchant marine sailors. Most sailors learn on the job, although previous sea experience in the Coast Guard or Navy is helpful. Graduation from high school is not required. Applicants must obtain a doctor's certificate stating that they are in excellent health, a letter from an employer stating that they will be hired if a job becomes available, and special identification papers, "merchant mariner's documents," from the Coast Guard.

Several training programs exist to help experienced sailors upgrade their skills, but only the school operated by the Seafarer's International Union of North America trains inexperienced sailors.

Employment, 1976	33,200
Projected employment, 1985	30,600
Percent change, 1976-85	-7.8
Average annual openings, 1976-85	400
Decline	-300
Replacement	700
Available training data	

Railroad occupations

Brake operators. On some railroads, operators receive a few days of training, but most learn their skills on the job. It usually takes a year to learn the job thoroughly. Employers prefer applicants who have a high school diploma, and require applicants to have good eyesight and hearing.

Employment, 1976	65,000
Projected employment. 1985	68,000
Percent growth, 1976-85	4.8
Average annual openings, 1976-85	1,700
Growth	300
Replacement	1,400
Available training data	

Conductors. Conductors are promoted from the ranks of qualified brake operators on the basis of seniority. To qualify, a person must have several years' experience as a brake operator and pass examinations covering signals, timetables, operating rules, and related subjects.

Employment, 1976	35,900
Projected employment, 1985	42,000
Percent growth, 1976-85	16.7
Average annual openings, 1976-85	2,200
Growth	700
Replacement	1,500
Available training data	

Locomotive engineers. Openings in engineer jobs usually are filled by training and promoting engineer helpers according to their seniority. Applicants for helper jobs must be at least 21 years old and have good eyesight, hearing, and color vision. High school graduates are preferred. Helpers are placed in engineer training programs within a year after they are hired. They qualify for promotion to engineer by proving their ability to operate locomotives and by passing a comprehensive examination on subjects such as mechanical and electrical equipment and operating rules and regulations.

Employment, 1976	33,300
Projected employment, 1985	39,500
Percent growth, 1976-85	18.6
Average annual openings, 1976-85	2,400
Growth	700
Replacement	1,700
Available training data	

Shop trades. Completing a 3- to 4-year apprenticeship program is the most common way to enter shop trades, although some helpers and laborers are upgraded to these jobs. A high school diploma is preferred but not required. Shop training in high school or vocational school is an advantage. Automobile repair and machining courses are useful for machinists. Courses in electricity and physics will help applicants who want jobs as electrical workers.

Employment, 1976	72,600
Projected employment, 1985	60,000
Percent change, 1976-85	-17.5
Average annual openings, 1976-85	800
Decline	-1,400
Replacement	2,200
Available training data	

Signal department workers. These workers are trained on the job. New employees are assigned as helpers to experienced workers. After 60 to 90 days of training, they may advance to assistants; after 2 to 4 years' additional training and experience, they may be promoted to signal installers or maintainers. Railroads prefer applicants who are high school or vocational school graduates and have had courses in blueprint reading, electricity, or electronics.

Employment, 1976	11,500
Projected employment, 1985	11,400
Percent change, 1976-85	-0.9
Average annual openings, 1976-85	400
Growth	0
Replacement	400
Available training data	

Station agents. These workers rise from the ranks of other railroad occupations. Experienced telegraphers, telephoners, tower operators, and clerks may advance to jobs as agents in small stations, and may be promoted to larger stations as they gain seniority.

Employment, 1976	7,000
Projected employment, 1985	3,000
Percent change, 1976-85	-57.1
Average annual openings, 1976-85	-300
Decline	-400
Replacement	100
Available training data	

Telegraphers, telephoners, and tower operators. These jobs usually are filled from the ranks of clerical workers according to seniority provisions. Upon promotion, new workers receive on-the-job training that covers operating rules, train orders, and station operations. Before the promotion is final, they must pass examinations on train operating rules and show that they can use all the equipment. A high school diploma generally is preferred and may be required by some railroads.

Employment, 1976	10,200
Projected employment, 1985	6,500
Percent change, 1976-85	-36.3
Average annual openings, 1976-85	-200
Decline	-400
Replacement	200
Available training data	

Track workers. Most workers acquire their skills in about 2 years of on-the-job training. A high school diploma is not required, but applicants should be able to read and write. The ability to perform heavy work is essential.

Employment	56,200
Projected employment, 1985	52,000
Percent change, 1976-85	-7.1
Average annual openings, 1976-85	800
Decline	-500
Replacement	1,300
Available training data	

Driving occupations

Intercity busdrivers. These workers are trained on the job. Most companies conduct 2- to 8-week training programs for new employees that include driving and classroom instruction. Minimum qualifications established by the U.S. Department of Transportation require intercity busdrivers to be at least 21 years old, pass a physical examination, and pass a written test on motor vehicle regulations. Most States require a chauffeur's license. Bus companies generally have even higher requirements. Most prefer applicants who are at least 25 years old; some prefer those who have truck or bus driving experience. A high school diploma is preferred, but not required. High school driver training is useful.

Employment, 1976	25,000
Projected employment, 1985	30,000
Percent growth, 1976-85	17.9
Average annual openings, 1976-85	1,400
Growth	500
Replacement	900
Available training data	

Local transit busdrivers. New drivers receive several weeks of classroom and driving instruction in which they learn company rules, safety regulations, how to keep records, and how to deal with passengers. Applicants must be at least 21 years old, have a chauffeur's license, and have good eyesight–with or without glasses. Most employers require applicants to pass a physical examination and a written test. A good driving record is essential. A high school diploma is not required, but is preferred by many employers.

Employment, 1976	81,000
Projected employment, 1985	99,000
Percent growth, 1976-85	22.5
Average annual openings, 1976-85	5,100
Growth	2,000
Replacement	3,100
Available training data	

Local truckdrivers. New drivers usually are trained on the job. Many drivers begin by working as freight handlers on the trucking company's loading dock. In most States, applicants must have a chauffeur's license, and employers prefer to hire individuals who have good driving records. The amount of driving experience required often depends on the size of truck to be driven and value of the cargo. A high school diploma is not required.

Employment, 1976	1,600,000
Projected employment, 1985	1,940,000
Percent growth, 1976-85	21.7
Average annual openings, 1976-85	73,000
Growth	38,000
Replacement	35,000
Available training data:	
Job Corps completions	[1] 46

[1] May include some long-distance truckdrivers.

Long-distance truckdrivers. Minimum qualifications set by the U.S. Department of Transportation require drivers to be at least 21 years old, pass a physical examination, and pass a written test on motor carrier safety regulations. Most States require drivers to have a chauffeur's license. Individual trucking companies may have even higher standards. Many companies specify height and weight requirements for drivers and some hire only applicants who have several years' experience driving trucks.

Driver training courses in high school or in a private driving school are good preparation, but they do not assure a job. Most truckdrivers start as freight handlers at a trucking company's loading dock, advance to local truckdriver, and then to long-distance driver.

Employment, 1976	467,000
Projected employment, 1985	520,000
Percent growth, 1976-85	10.9
Average annual openings, 1976-85	15,400
Growth	5,700
Replacement	9,700
Available training data	

Parking attendants. These workers are trained on the job. Some employers offer training, ranging from a few hours to a week, that includes a review of proper driving techniques and an outline of company policy on recordkeeping procedures and damage claims. Applicants must have a driver's license and be able to drive all types of cars. The ability to keep records of claim tickets, compute parking charges, and make change also is important. Generally, employers prefer high school graduates.

Employment, 1976	38,000
Projected employment, 1985	40,000
Percent growth, 1976-85	5.3
Average annual openings, 1976-85	2,500
Growth	200
Replacement	2,300
Available training data	

Taxicab drivers. In most cities taxi drivers must have a chauffeur's license and pass a written test on taxicab and traffic regulations to obtain a special license issued by the local police or safety department or Public Utilities Commission. Some companies teach drivers taxicab regulations and the location of streets. A large number of companies hire only applicants who are at least 21 and some require drivers to be 25 or older.

Employment, 1976	94,000
Projected employment, 1985	94,000
Percent growth, 1976-85	0.4
Average annual openings, 1976-85	4,200
Growth	0
Replacement	4,200
Available training data	

Scientific and Technical Occupations

Conservation occupations

Foresters. A bachelor's degree with a major in forestry generally is required to become a forester. Because of the large supply of forestry graduates, however, many employers prefer applicants who have advanced degrees. Teaching and research generally require advanced degrees.

Through the mid-1980's, persons seeking forester positions can expect to face competition. In recent years, the number of forestry graduates has exceeded available openings, and this situation is expected to continue. Opportunities will be better for individuals who can offer an employer either an advanced degree or several years of related work experience.

Growth and replacement needs are expected to create about 1,100 openings annually between 1976 and 1985. The National Center for Education Statistics projects that about 2,700 bachelor's degrees in forestry will be awarded each year during this period. Followup data on forestry graduates indicate that about two-thirds, including those who go on to graduate study, seek entry to the field. If this entry pattern continues, about 1,700 graduates can be expected to seek forester positions each year.

Other sources of supply are immigrants, reentrants to the labor force, and transfers from other occupations. Foresters who enter other occupations also create job openings. Current data on occupational mobility are not adequate to assess the net effect of transfers as a source of supply or openings. Nor are data on immigrants and reentrants to the labor force adequate to allow an assessment of the effect of these sources of supply. Overall, however, it appears that the number of persons seeking jobs as foresters will exceed available openings. As a result, a number of forestry graduates will be forced to seek employment in other fields.

Employment, 1976	25,000
Projected employment, 1985	29,000
Percent growth, 1976-85	15.7
Average annual openings, 1976-85	1,100
Growth	400
Replacement	700

Available training data:

Degrees in forestry:	*1975-76*	*Projected 1976-85 (annual average)*
Bachelor's degrees	2,660	2,709
Master's degrees	405	522
Doctor's degrees	92	148

Forestry technicians. Most persons qualify for beginning jobs as forestry technicians by completing a specialized course of study in a 1- or 2-year postsecondary program, or through work experience on firefighting crews, in tree nurseries, or in other forest work. Most employers require a high school diploma. Postsecondary training can be obtained in technical institutes, junior or community colleges, and some universities.

Employment, 1976	11,000
Projected employment, 1985	14,000
Percent growth, 1976-85	27.2
Average annual openings, 1976-85	600
Growth	300
Replacement	300

Available training data:

Job Corps completions	175
Junior college graduates	2,133

Range managers. A bachelor's degree with a major in range management, range science, or a closely related field usually is required for employment as a range manager. An advanced degree generally is necessary for research and teaching positions. In addition, courses in economics, forestry, computer science, and wildlife and recreation are considered useful. Many college students obtain valuable experience through summer jobs with Federal Government agencies, such as the Forest Service or Bureau of Land Management.

Employment, 1976	3,000
Projected employment, 1985	4,100
Percent growth 1976-85	37.5
Average annual openings, 1976-85	200
Growth	100
Replacement	100

Available training data:

Degrees in range management:

Bachelor's degrees	174
Master's degrees	39
Doctor's degrees	18

Soil conservationists. Because few colleges and universities offer degrees in soil conservation, most soil conservationists have degrees in agronomy or a closely related field of natural resource science, such as wildlife biology, forestry, and agricultural education. A background in agricultural engineering and courses in cartography are very useful.

Employment, 1976	7,500
Projected employment, 1985	9,000
Percent growth, 1976-85	20.0
Average annual openings, 1976-85	400
Growth	200
Replacement	200

Available training data:

Degrees in agronomy:

Bachelor's degrees	958
Master's degrees	303
Doctor's degrees	178

Engineers

Engineers. A bachelor's degree in engineering generally is required for most entry positions. College graduates who have degrees in one of the physical sciences or mathematics also may qualify for some beginning jobs. Occasionally, experienced technicians are able to advance to some engineering jobs. Graduate training in engineering is being emphasized for a number of jobs, however, and is essential for teaching and research, and for advancement in many areas.

In all States, engineers must be registered if they offer their services directly to the public, or if they design buildings, dams, or other projects where safety is a factor. The majority of engineers are not registered. Registration requirements include a degree from an accredited engineering school, 4 years of relevant work experience, and passing a State-board written examination.

Employment opportunities for engineers are expected to be good through the mid-1980's in most specialties. Growth and replacement needs are expected to result in an annual average of about 56,500 openings between 1976 and 1985. The major source of supply of engineers is new graduates majoring in engineering. Projections of the National Center for Education Statistics indicate that about 62,300 bachelor's degrees in engineering are expected to be awarded annually during this period. Follow-up data on college graduates of the 1960's indicate that about 85 percent of the bachelor's degree recipients in engineering, including those who went on to graduate study, actually entered the field. This proportion dropped to 80 percent for graduates during the mid-1970's. Because of the high level of recruiting during this period, this entry rate probably represents fairly accurately the proportion of graduates who seek engineering jobs. If an 80-percent rate continues, an average of about 49,800 engineers are expected to enter the field annually. In addition, data from the same followup studies indicate that if past trends continue, about 7,000 graduates in other fields, primarily mathematics and the natural sciences, will seek engineering jobs each year.

Other sources of supply are immigrants, reentrants to the labor force, and transfers from other occupations. Engineers who enter other occupations also create job openings. Current data on occupational mobility are not adequate to assess the net effect of transfers as a source of supply or openings. But there is evidence that the number of persons transferring into engineering is related to the availability of graduates for the number increases during shortages and declines when the supply is sufficient. Data on immigrants and reentrants to the labor force are not adequate to allow an assessment of the effect of these sources of supply. Overall, however, it appears that the number of persons likely to seek employment as engineers will roughly equal the number of expected job openings.

Employment, 1976	1,133,000
Projected employment, 1985	1,415,000
Percent growth, 1976-85	25.0
Average annual openings, 1976-85	56,500
Growth	31,500
Replacement	25,000

Available training data:

Degrees in engineering:[1]

	1975-76	*Projected 1976-85 (annual average)*
Bachelor's degrees	46,331	62,300
Master's degrees	16,342	16,382
Doctor's degrees	2,821	2,454

[1] Includes engineering technology.

Environmental scientists

Geologists. A bachelor's degree in geology or a related field is appropriate training for many entry jobs. An advanced degree is helpful for promotion in most types of work and is required for college teaching and some research positions.

Employment opportunities in geology are expected to be good for geology graduates and persons who have a degree in a related science with geology courses. Growth in the employment of geologists and replacement needs are expected to result in about 2,300 openings each year between 1976 and 1985. The major source of supply of geologists is new graduates majoring in geology and earth sciences. The National Center for Education Statistics projects that bachelor's degrees in these majors will average about 4,900 during this period. Followup data on college graduates of the 1960's indicate that about 30 percent of the bachelor's degree recipients in these majors, including those who went on to graduate study in geology or the earth sciences, actually entered geology. The rapid increase in the employment of geologists during the past few years, however, indicates that this proportion may have increased. Assuming an entry rate of 30 percent at a minimum, at least 1,500 geology and earth science graduates can be expected to seek entry to the field annually. In addition, data from the same followup studies indicate that if past trends continue, at least 450 graduates in other fields can be expected to seek geologist jobs each year.

Other sources of supply are immigrants, reentrants to the labor force, and transfers from other occupations. Geologists who enter other occupations also create job openings. Current data on occupational mobility are not adequate to assess the net effect of transfers, as a source of supply or openings, however. Nor is it possible to determine the effects of immigration and reentrants on supply. Overall, however, it appears that the number of persons likely to seek employment as geologists will roughly equal the number of expected job openings in the field.

Employment, 1976	34,000
Projected employment, 1985	47,500
Percent growth, 1976-85	38.1
Average annual openings, 1976-85	2,300
Growth	1,500
Replacement	800

Available training data:

Degrees in geology and earth science:

	1975-76	*Projected 1976-85 (annual average)*
Bachelor's degrees	4,332	4,912
Master's degrees	1,160	1,230
Doctor's degrees	322	366

Geophysicists. A bachelor's degree in geophysics or a geophysical specialty, or a bachelor's degree in a related field of science or engineering with courses in geophysics, physics, geology, mathematics, chemistry, and engineering generally is the minimum requirement for these positions. Graduate training usually is necessary for jobs in research and college and university teaching, and for supervisory positions in exploration activities.

Employment, 1976	12,000
Projected employment, 1985	16,700
Percent growth, 1976-85	38.0
Average annual openings, 1976-85	800
Growth	500
Replacement	300

Available training data:

Degrees in geophysics and seismology:

Bachelor's degrees	89
Master's degrees	62
Doctor's degrees	29

Meteorologists. Generally, the minimum requirement is a bachelor's degree in meteorology or a related science, usually physics, mathematics, or engineering, with courses in meteorology. An advanced degree is necessary for some positions, particularly in research and in college and university teaching.

Employment, 1976	5,500
Projected employment, 1985	6,300
Percent growth, 1976-85	14.0
Average annual openings, 1976-85	200
Growth	100
Replacement	100

Available training data:

Degrees in atmospheric sciences and meteorology:

Bachelor's degrees	365
Master's degrees	197
Doctor's degrees	61

Oceanographers. An advanced degree, preferably a Ph. D. degree in oceanography, one of the natural sciences, or engineering generally is required to become an oceanographer. A bachelor's degree is sufficient for beginning jobs as a research or laboratory assistant in oceanography.

Employment, 1976	2,700
Projected employment, 1985	3,400
Percent growth, 1976-85	25.3
Average annual openings, 1976-85	150
Growth	100
Replacement	50

Available training data:

Degrees in oceanography:

Bachelor's degrees	240
Master's degrees	152
Doctor's degrees	81

Life science occupations

Biochemists. Many beginning jobs in biochemistry, especially in research and teaching, require an advanced degree. A Ph. D. degree usually is necessary for high-level biochemical research and for advancement to management and administrative jobs. A bachelor's degree with a major in biochemistry or chemistry, or with a major in biology and a minor in chemistry, may be sufficient for entry jobs as research assistants or technicians.

Employment, 1976	12,700
Projected employment, 1985	15,700
Percent growth, 1976-85	23.6
Average annual openings, 1976-85	600
Growth	300
Replacement	300

Available training data:

Degrees in biochemistry:

Bachelor's degrees	1,622
Master's degrees	252
Doctor's degrees	431

Life scientists. This group includes scientists such as botanists, zoologists, microbiologists, and nutritionists. Although a bachelor's degree is adequate for some jobs in these fields, most positions require graduate training. A Ph. D. degree usually is required to teach in a college or university, or to obtain a senior research or administrative position. A professional health degree, such as an M.D. or D.D.S., is necessary for some jobs in medical research.

Most colleges and universities offer life science curriculums, but different schools may emphasize different areas. For example, liberal arts colleges may emphasize the biological sciences, while many State universities may concentrate on programs in agricultural science. Students seeking careers in the life sciences should obtain as broad a background as possible in the sciences, including biology, chemistry, physics, and mathematics.

Employment prospects for advanced degree holders are expected to be good, but persons who have bachelor's degrees will face competition for jobs. Growth in employment of life scientists and replacement needs are expected to result in about 12,000 openings each year between 1976 and 1985. The National Center for Education Statistics projects that about 80,000 bachelor's degrees in the biological and agricultural sciences will be awarded annually during this period. Followup data on college graduates indicate that in the past about 25 percent of those who received bachelor's degrees in these areas, including students who went on to graduate study in the life sciences, actually entered the field. (In the past, individuals who earned bachelor's degrees in the life sciences have become secondary school teachers, laboratory technicians, ranchers or farmers, or have gone to medical, dental, or veterinary school.) Thus, if past entry patterns continue, an average of 20,000 biology and agricultural sciences graduates can be expected to seek life scientist positions each year.

Prospects for persons who have advanced degrees appear more favorable. About 12,000 master's degrees and 5,500 doctorates will be granted in the life sciences annually between 1976 and 1985. Followup data indicate that about 55 percent of the master's degree recipients and 95 percent of the doctorate recipients entered the field in the past. If this pattern continues, about 9,500 individuals with advanced degrees, including those having a master's degree already, can be expected to enter the life sciences annually.

Although this number compares very favorably with the estimate of annual openings (12,000), data from the same followup studies indicate that several thousand graduates in other fields also can be expected to seek life scientist positions. Because some positions require a professional medical degree, a number of individuals who have these degrees are expected to enter the field.

Other sources of supply are immigrants, reentrants to the labor force, and transfers from other occupations. Life scientists who enter other occupations also create job openings. Current data on occupational mobility are not adequate to assess the net effect of transfers as a source of supply or openings, however. Nor is it possible to determine the effects of immigration and reentrants on supply. Overall, it appears that the number of persons with advanced degrees who will seek employment as life scientists will roughly equal the number of job openings in the field.

Employment, 1976	205,000
Projected employment, 1985	265,000
Percent growth, 1976-85	28.6
Average annual openings, 1976-85	12,000
Growth	6,500
Replacement	5,500

Available training data:

Degrees in biological sciences and in agricultural and natural resources:

	1975-76	*Projected 1976-85 (annual average)*
Bachelor's degrees	73,677	80,320
Master's degrees	9,922	11,967
Doctor's degrees	4,320	5,494

Soil scientists. A bachelor's degree in soil science, agronomy, or a closely related field usually is required. Some employers also require applicants to have had courses in chemistry and cartography. Soil scientists who have trained in both field work and laboratory work may have the edge in obtaining the best jobs. A few States require certification of soil scientists who inspect soil conditions before construction starts. To be certified, applicants must have a bachelor's degree and 3 years' experience as a soil scientist or a master's degree and 2 years' experience. Applicants must pass a written examination.

Employment, 1976	2,500
Projected employment, 1985	2,800
Percent growth, 1976-85	12.0
Average annual openings, 1976-85	80
Growth	30
Replacement	50

Available training data:

Degrees in soil science:

Bachelor's degrees	434
Master's degrees	121
Doctor's degrees	53

Mathematics occupations

Mathematicians. Although a bachelor's degree in mathematics is adequate for some jobs in private industry and government, employers usually require an advanced degree. A Ph. D. degree almost always is required to teach in a college or university.

Competition for mathematician jobs is expected to remain keen throughout the 1976-85 period. Intense competition is expected for jobs in academic areas because declining student enrollments in mathematics will require fewer mathematics teachers. Individuals who have advanced degrees in applied mathematics should have the best chances for employment. Those mathematics degree holders who are unable to locate mathematician jobs may find openings in other areas requiring a mathematics background, such as actuarial work, statistics, and computer work.

Growth in the employment of mathematicians and replacement needs are expected to create about 1,000 job openings annually between 1976 and 1985. The major source of supply of these workers is new graduates majoring in mathematics. The National Center for Education Statistics projects that about 500 doctorates and 4,100 master's degrees will be awarded each year during this period. Followup data on college graduates of the 1960's indicate that almost half of the master's degree recipients and almost all of the doctorate recipients actually entered the field. During the 1970's, the entry rate for master's degree recipients dropped to slightly more than one-fourth, largely due to the growing competition for mathematician jobs and the availability of jobs in the computer field that utilized a mathematics background. However, at least one-third of the master's degree recipients and almost all the doctorate recipients apparently did seek mathematician jobs. If the same proportions of degree recipients seek mathematician positions in the future, about 1,600 advanced degree holders, including doctorate recipients employed as mathematicians, are expected to seek mathematics positions each year. If past trends continue, several hundred graduates in other fields, primarily the natural sciences, could look for mathematician jobs.

Other sources of supply are immigrants, reentrants to the labor force, and transfers from other occupations. Mathematicians who enter other occupations also create job openings. Current data on occupational mobility are not adequate to assess the net effect of transfers as a source of supply or openings. Nor are data on immigrants and reentrants to the labor force adequate to evaluate the effect of these sources on supply. Overall, however, it appears that, despite a continued decline in the number of persons receiving advanced degrees in mathematics, many degree holders will have to seek employment in other fields.

Employment, 1976	38,000
Projected employment, 1985	41,000
Percent growth, 1976-85	8.8
Average annual openings, 1976-85	1,000
Growth	300
Replacement	700

Available training data:

Degrees in mathematics:

Bachelor's degrees	15,248
Master's degrees	3,222
Doctor's degrees	671

Statisticians. A bachelor's degree in statistics or mathematics generally is required to become a statistician. For some jobs, however, a bachelor's degree in economics or another applied field and a minor in statistics is preferable. An advanced degree is required for some positions, particularly college teaching. Courses in computer programming, systems analysis, and other computer-related subject areas are highly recommended.

Employment, 1976	24,000
Projected employment, 1985	30,000
Percent growth, 1976-85	26.7
Average annual openings, 1976-85	1,500
Growth	700
Replacement	800

Available training data:

Degrees in statistics:

Bachelor's degrees	248
Master's degrees	471
Doctor's degrees	141

Physical scientists

Astronomers. The usual requirement for a job in astronomy is a Ph. D. degree. Persons who have less education may qualify for some entry level jobs; however, advancement in most areas is open only to those who have a doctorate. In 1976, about 50 colleges and universities had programs leading to the bachelor's degree in astronomy. Students with a bachelor's degree in physics, or in mathematics with a physics minor, usually can qualify for graduate programs in astronomy. Almost all doctorate recipients can be expected to seek entry to the field. Unless the number of doctorates granted in the future is substantially lower than the number granted in 1975-76, many doctorate recipients may be forced to enter other occupations.

Employment, 1976	2,000
Projected employment, 1985	2,100
Percent growth, 1976-85	5.0
Average annual openings, 1976-85	40
Growth	10
Replacement	30

Available training data:

Degrees in astronomy:

Bachelor's degrees	116
Master's degrees	81
Doctor's degrees	113

Chemists. A bachelor's degree in chemistry usually is the minimum requirement for entry positions in analysis and testing, quality control, technical service and sales, or jobs as assistants to senior chemists in research and development laboratories. Graduate training is essential for many positions, and is helpful for advancement in all types of work. A Ph. D. degree generally is required for teaching in colleges and universities.

Employment opportunities in chemistry are expected to be good for graduates at all degree levels through the mid-1980's. About three-fourths of the available openings will be in private industry, primarily in the development of new products. Little growth in college and university employment is expected, and competition for teaching positions will be keen.

Growth in the employment of chemists and replacement needs are expected to average about 6,300 openings annually between 1976 and 1985. The major source of supply of chemists is new graduates majoring in chemistry. Projections of the National Center for Education Statistics indicate that an annual average of about 11,200 bachelor's degrees in chemistry are expected to be awarded during this period. Followup data on college graduates indicate that in the past fewer than half of those who received bachelor's degrees in chemistry, including those who went on to graduate study in chemistry, actually entered the field. (Many of those not entering chemistry have gone on to medical, dental, or veterinary schools, or have become secondary school teachers.) Thus, if past entry patterns continue, an average of 5,000 new graduates are expected to seek jobs as chemists each year. In addition, data from these same followup studies indicate that about 2,000 recent graduates in other fields, primarily biology and other natural sciences, could seek chemist jobs each year.

Other sources of supply are immigrants, reentrants to the labor force, and transfers from other occupations. Chemists who enter other occupations also create job openings. Current data on occupational mobility are not adequate to assess the net effect of transfers as a source of supply or openings, however. Nor is it possible to determine the effects of immigration and reentrants on supply. Overall, however, it appears that the number likely to seek employment as chemists will roughly equal the number of expected job openings in the field.

Employment, 1976	148,000
Projected employment, 1985	175,000
Percent growth, 1976-85	19.0
Average annual openings, 1976-85	6,400
Growth	3,200
Replacement	3,200

Available training data:

Degrees in chemistry:

	1975-76	*Projected 1976-85 (annual average)*
Bachelor's degrees	11,019	11,183
Master's degrees	1,783	1,980
Doctor's degrees	1,621	1,431

Food scientists. A bachelor's degree with a major in food science or in the physical or life sciences, such as chemistry and biology, is the usual minimum requirement for entry jobs. An advanced degree is necessary for many jobs, particularly research and college teaching and for some management level jobs in industry. About 60 colleges and universities offered programs leading to the bachelor's degree in food science in 1976. Undergraduates usually take courses in physics, chemistry, mathematics, biology, the social sciences and humanities, and business administration, as well as food science courses. Food science courses cover areas such as preservation, processing, sanitation, and marketing of foods. People planning careers as food scientists should have analytical minds and like details and technical work.

Employment, 1976	7,000
Projected employment, 1985	8,400
Percent growth, 1976-85	20.0
Average annual openings, 1976-85	300
Growth	150
Replacement	150

Available training data:

Degrees in food science and technology:

Bachelor's degrees	580
Master's degrees	282
Doctor's degrees	81

Physicists. Graduate training in physics or in a field closely related to a specialized field in physics is necessary for most jobs. A doctorate usually is required for teaching positions in colleges and universities, and for senior research positions. A bachelor's degree is adequate for some entry level jobs, but graduate training is needed for advancement.

For persons who have graduate degrees in physics, employment opportunities are expected to be favorable through the mid-1980's. Most openings will be in research and development work. However, competition is expected to be keen for teaching positions in colleges and universities. Persons who have only a bachelor's degree are expected to face very stiff competition for physicist jobs.

Growth in the employment of physicists and replacement needs are expected to result in an annual average of about 1,100 openings between 1976 and 1985. Most of these openings will require graduate training and a substantial number will require doctorates.

College graduates who have majored in physics are the primary source of supply. Since individuals who have only a bachelor's degree in physics rarely find physicist jobs, the number of graduate degrees in physics that are expected to be awarded is of more importance. (Many of those who do not pursue a graduate degree enter high school teaching, computer-related occupations, and engineering.) The National Center for Education Statistics projects that an average of about 1,500 master's and 700 doctor's degrees will be awarded annually between 1976 and 1985. Followup data on college graduates of the 1960's indicate that about 60 percent of the master's degree recipients and 95 percent of the doctorate recipients entered the field. Although the proportion actually entering dropped for graduates in the 1970's, the entry rates of the 1960's are considered to more accurately reflect the proportion seeking physicist jobs between 1976 and 1985. In addition, it should be noted that some doctorate recipients were employed as physicists after acquiring their master's degrees and, therefore, were not new entrants. If past trends continue, an average of about 1,200 new graduate degree recipients are expected to seek physicist jobs each year.

In addition to new graduates in physics, individuals also enter the field from other sources: Graduates with degrees in related fields, immigrants, reentrants to the labor force, and transfers from other occupations. physicists who enter other occupations also create openings. Current data on occupational mobility are not adequate to assess the net effect of transfers as a source of supply or openings. Overall, however, it appears that the number of persons likely to seek employment as physicists will roughly equal the number of expected openings in the field.

Employment, 1976	48,000
Projected employment, 1985	53,000
Percent change, 1976-85	8.7
Average annual openings, 1976-85	1,100
Growth	500
Replacement	600

Available training data:

	1975-76	*Projected 1976-85 (annual average)*
Degrees in physics:		
Bachelor's degrees	3,456	3,724
Master's degrees	1,421	1,531
Doctor's degrees	968	673

Other scientific and technical occupations

Drafters. Specialized training in technical institutes, junior and community colleges, extension divisions of universities, and vocational and technical high schools generally provides the best preparation for beginning drafters. The necessary skills also may be acquired by combining on-the-job training programs with part-time schooling, through 3- or 4-year apprenticeship programs, or in the Armed Forces. A high school diploma usually is required. High school or vocational school courses in mathematics, physical sciences, mechanical drawing, and drafting are useful.

Employment, 1976	320,000
Projected employment, 1985	420,000
Percent growth, 1976-85	30.6
Average annual openings, 1976-85	16,500
Growth	10,900
Replacement	5,600

Available training data:

Public vocational education completions	29,317
Private vocational education completions	1,900
Job Corps completions	77
Apprenticeship completions	246

Engineering and science technicians. Many combinations of education and work experience qualify individuals for these occupations, but most employers prefer applicants who have had some specialized technical training. This specialized training consists of 1 to 4 years of full-time study at a technical institute, junior or community college, extension division of a college or university, or vocational-technical high school. Training also can be acquired on the job, through part-time courses in postsecondary schools, or through correspondence school courses. Experience in technical jobs in the Armed Forces also can be good preparation for these occupations. A high school diploma usually is required.

Employment, 1976	586,000
Projected employment, 1985	760,000
Percent growth, 1976-85	29.9
Average annual openings, 1976-85	29,000
Growth	19,500
Replacement	9,500

Available training data:

Public vocational education completions	28,234
Private vocational education completions	6,000
Apprenticeship completions	[1] 354
Junior college graduates	[2] 46,832

[1] Electronics technicians.

[2] Includes graduates from all mechanical and engineering technologies, general natural science technologies, marine and oceanographic technologies, and general laboratory technologies.

Surveyors. A combination of postsecondary school courses in surveying and extensive on-the-job training is the most common way to enter this occupation. Junior colleges, technical institutes, and vocational schools offer 1-, 2-, and 3-year programs in surveying. Some colleges and universities offer degrees in surveying or a closely related field such as geodesy, photogrammetry, or civil engineering. High school courses in mathematics, drafting, and mechanical drawing provide a good background. Surveyors who are responsible for locating and describing land boundaries must be licensed by the State in which they work. Requirements for licenses vary, but applicants generally must have 3 to 8 years of surveying experience and must pass a written test.

Employment, 1976	52,000
Projected employment, 1985	74,000
Percent growth, 1976-85	41.5
Average annual openings, 1976-85	3,500
Growth	2,400
Replacement	1,100

Available training data:

Junior college graduates	2,219

Mechanics and Repairers

Telephone craft occupations

Central office craft occupations. Trainee jobs generally are filled by employees already with the company, such as telephone operators or line installers. Occasionally, workers are hired from outside. A high school diploma is not required, but a basic knowledge of electricity or electronics is helpful. Telephone training in the Armed Forces is good preparation for the job. New craft workers receive both classroom instruction and on-the-job training. Some vocational schools, particularly those in rural areas served by small independent telephone companies, also offer training. A few people learn these crafts through apprenticeship programs designed by State employment agencies in conjunction with local telephone companies. Because electrical wires usually are color coded, applicants must not be color blind.

Employment, 1976	135,000
Projected employment, 1985	165,000
Percent growth, 1976-85	23.3
Average annual openings, 1976-85	5,000
Growth	3,500
Replacement	1,500
Available training data	-

Central office equipment installers. These workers learn their skills on the job. New employees attend classes the first few weeks to learn basic installation and then begin on-the-job training. Often trainees will be transported to the plant where the equipment is manufactured to receive their training. It usually takes several years to become a skilled installer, and training continues throughout an installer's career to improve skills and teach new installing techniques. A high school diploma generally is preferred, and courses in blueprint reading and electronic theory are helpful. Because electrical wires are color coded, applicants must not be color blind.

Employment, 1976	20,000
Projected employment, 1985	16,000
Percent change, 1976-85	-20.0
Average annual openings, 1976-85	-300
Decline	-500
Replacement	200
Available training data	-

Line installers and cable splicers. These workers usually are trained on the job. Classrooms are equipped with actual telephone apparatus, including poles and other fixtures, to simulate working conditions as much as possible. Trainees learn how to climb poles and are taught safe working practices to avoid falls and contact with power wires. After several weeks, trainees generally are assigned to a crew for on-the-job training under a line supervisor. Some small independent telephone companies, particularly in rural areas, rely on local vocational and technical schools to provide classroom training. A few 4-year apprenticeships also are available in which State employment agencies provide classroom training. A high school diploma is not required. Training in installing telephone systems while in the Armed Forces is helpful. Because the job is strenuous, applicants usually are given physical examinations. Most line installers and cable splicers transfer to other telephone occupations as they advance in age.

Employment, 1976	54,000
Projected employment, 1985	55,000
Percent growth, 1976-85	2.8
Average annual openings, 1976-85	600
Growth	200
Replacement	400
Available training data	-

Telephone and PBX installers and repairers. These workers are trained on the job. Telephone companies provide several weeks of classroom instruction in subjects such as mathematics and electrical and electronic theory, supplemented by on-the-job training. Many small independent telephone companies, particularly in rural areas, rely on local vocational and technical schools to train workers. A few 4-year apprenticeships also are available in which State employment agencies provide classroom training. Because telephone wires are color coded, applicants must not be color blind. Physical examinations are sometimes required, and applicants may have to pass a test to determine their aptitude for the job. Often trainees are chosen from current telephone company employees. A high school diploma is preferred but not required.

Employment, 1976	110,000
Projected employment, 1985	135,000
Percent growth, 1976-85	24.2
Average annual openings, 1976-85	4,100
Growth	2,900
Replacement	1,200
Available training data	-

Other mechanics and repairers

Air-conditioning, refrigeration, and heating mechanics. Most workers start as helpers and learn their skills on the job in about 3 years. A few individuals learn the trade through a 4-year apprenticeship program that combines on-the-job training with classroom instruction in related subjects. In addition, many high schools and vocational schools offer courses in air-conditioning, refrigeration, and other subject areas that prepare students for entry jobs. Employers generally prefer to hire high school graduates with vocational education courses to fill entry level jobs. Courses in mathematics, physics, basic mechanics, electronics, and blueprint reading are helpful.

Employment, 1976	175,000
Projected employment, 1985	285,000
Percent growth, 1976-85	62.9
Average annual openings, 1976-85	17,400
Growth	12,200
Replacement	5,200

Available training data:

Public vocational education completions	14,402
Private vocational education completions	3,100
Job Corps completions	252
Apprenticeship completions	360

Appliance repairers. These workers usually start as helpers and receive their training on the job. Formal training in appliance repair is available in some vocational and technical schools, and community colleges. Graduates of these programs still need on-the-job experience, however, to become familiar with a variety of appliances and repairs. Generally, it takes about 3 years to learn the trade. A high school diploma usually is required and courses in appliance repair, electricity, electronics, shop mathematics, and blueprint reading provide a good background. To keep up with changes in appliance design, experienced repairers may attend training programs conducted by appliance manufacturers.

Employment, 1976	144,000
Projected employment, 1985	172,000
Percent growth, 1976-85	19.6
Average annual openings, 1976-85	7,000
Growth	3,200
Replacement	3,800

Available training data:

Public vocational education completions	4,663
Private vocational education completions	500
Job Corps completions	16

Automobile body repairers. Generally 3 to 4 years of on-the-job training are necessary to learn all phases of automobile body repair. Most repairers learn informally on the job, but completion of a 3- or 4-year apprenticeship that combines on-the-job training with classroom instruction in safety procedures, shop mathematics, and business is the recommended way to enter this occupation. Although high school graduation is not required, most employers consider it an asset. High school or vocational school courses in automobile body repair or automobile mechanics are helpful.

Employment, 1976	174,000
Projected employment, 1985	200,000
Percent growth, 1976-85	15.3
Average annual openings, 1976-85	6,000
Growth	2,900
Replacement	3,100

Available training data:

Public vocational education completions	21,307
Private vocational education completions	800
Job Corps completions	765
Apprenticeship completions	266

Automobile mechanics. Most automobile mechanics learn their trade through 3 to 4 years of on-the-job experience, but additional time may be needed to learn a difficult specialty such as automatic transmission repair. Training authorities usually recommend completion of a 3- or 4-year apprenticeship program which combines on-the-job experience with classroom instruction in mathematics, physics, shop safety, and customer relations. Automobile mechanic training in the Armed Forces is good preparation. High school or vocational school courses in science, mathematics, automobile repair, and machine shop also are useful. A high school diploma is preferred but not required.

Employment, 1976	790,000
Projected employment, 1985	915,000
Percent growth, 1976-85	15.9
Average annual openings, 1976-85	32,000
Growth	14,000
Replacement	18,000

Available training data:

Public vocational education completions	82,656
Private vocational education completions	3,900
Job Corps completions	1,669
Apprenticeship completions	1,343

Boat-engine mechanics. Most mechanics learn on the job. Generally 2 to 3 years of experience are required to become skilled in repairing both outboard and inboard motors. A high school diploma is preferred by employers, but is not required. High school or vocational school courses in small engine repair, auto mechanics, and machine shop are helpful.

Employment, 1976	15,000
Projected employment, 1985	17,700
Percent growth, 1976-85	15.0
Average annual openings	800
Growth	300
Replacement	500
Available training data	

Business machine repairers. These workers usually are hired as trainees and taught their skills on the job. Trainees who work in a manufacturer's branch office or for a franchised dealer usually receive several weeks to several months of training at a school sponsored by the manufacturer. Training offered by independent repair shops generally is less formal, with trainees completing a self-study course and receiving on-the-job training from an experienced repairer.

A few repairers learn their skills by completing an apprenticeship program.

Applicants must be high school graduates, and some employers require at least 1 year of technical training in basic electricity or electronics. Employers like to hire veterans who have had this type of training in the Armed Forces. Good eyesight, including color vision, and good hearing are important. High school courses in physics, chemistry, and mathematics are helpful.

Employment, 1976	58,000
Projected employment, 1985	80,000
Percent growth, 1976-85	37.8
Average annual openings, 1976-85	3,400
Growth	2,400
Replacement	1,000

Available training data:[1]

Public vocational education completions	941
Private vocational education completions	700
Job Corps completions	43
Apprenticeship completions	567

[1] May include some computer service technicians.

Computer service technicians. Employers usually require applicants to have 1 to 2 years of post-high school training in basic electronics or electrical engineering from a computer school, a technical institute, a junior college, or college. A few technicians are trained through apprenticeship programs. Electronics training in the Armed Forces also is excellent preparation. Generally, 6 months to 2 years of on-the-job experience is required before newly hired technicians are considered competent to work on the more complex systems. High school courses in mathematics, chemistry, and physics are considered good preparation.

Employment, 1976	50,000
Projected employment, 1985	93,000
Percent growth, 1976-85	86.0
Average annual openings, 1976-85	5,200
Growth	4,800
Replacement	400

Available training data:

Junior college completions	188

Diesel mechanics. Most workers learn their skills informally on the job or through an apprenticeship program that combines on-the-job training with classroom instruction. Generally 3 to 4 years is required to become skilled in all aspects of diesel engine repair. Trade and technical school courses in diesel engine maintenance, and experience repairing vehicles in the Armed Forces or as a hobby are useful. Employers prefer to hire high school graduates. Courses in blueprint reading, auto repair, and machine shop are helpful, as are courses in science and mathematics. Good physical condition is important because mechanics often have to lift heavy engine parts.

Employment, 1976	100,000
Projected employment, 1985	125,000
Percent growth, 1976-85	22.9
Average annual openings, 1976-85	5,000
Growth	2,600
Replacement	2,400

Available training data:

Public vocational education completions	5,316
Private vocational education completions	3,500
Job Corps completions	137

Farm equipment mechanics. Most farm equipment mechanics begin as helpers and learn their skills on the job. Employers generally prefer to hire high school graduates who have a farm background. Usually, at least 3 years of on-the-job experience are necessary before a person is able to handle all types of repairs. Some mechanics learn their skills by completing a 3- to 4-year apprenticeship program, while others learn through a vocational program. High school courses in automobile repair, machine shop, science, and mathematics are helpful.

Employment, 1976	66,000
Projected employment, 1985	82,000
Percent growth, 1976-85	22.4
Average annual openings, 1976-85	4,000
Growth	1,700
Replacement	2,300

Available training data:

Job Corps completions	34

Industrial machinery repairers. Most workers learn their skills on the job as helpers to experienced workers by rotating from job to job for several years. Others learn their trade through 4-year apprenticeship programs that combine on-the-job training with classroom instruction in welding, blueprint reading, shop mathematics, and safety. A high school diploma is not required, but high school or vocational school courses in mathematics and machine shop may be helpful. Good physical condition and agility are necessary because repairers sometimes have to lift heavy equipment or climb to reach large machines.

Employment, 1976	320,000
Projected employment, 1985	500,000
Percent growth, 1976-85	57.0
Average annual openings, 1976-85	30,000
Growth	20,000
Replacement	10,000

Available training data:

Job Corps completions	61
Apprenticeship completions	920

Jewelers. These workers generally learn the jewelry trade either by serving an apprenticeship in a jewelry factory, or through informal on-the-job training while working for an experienced jeweler. Apprentices usually are selected from among the production workers already employed in a jewelry factory. Apprenticeships are specialized, teaching only one skill, perhaps stone setting or modelmaking, in 3 to 4 years. For an individual to learn all the major skills of the trade, several apprenticeships would have to be served. Most jewelers learn only two or three skills in this way, and learn others on the job.

Some technical schools offer jewelry repair courses that are good training for someone outside the industry. These courses can last from 6 months to 3 years, depending on the particular skill being learned. Employers prefer to hire high school graduates. Courses in art, mechanical drawing, and metalworking are helpful.

Employment, 1976	19,000
Projected employment, 1985	21,000
Percent growth, 1976-85	10.5
Average annual openings, 1976-85	1,300
Growth	200
Replacement	1,100
Available training data	-

Maintenance electricians. Most maintenance electricians work at least 4 years informally on the job to learn their trade. Some workers learn through 4-year apprenticeship programs which combine on-the-job training with classroom instruction in subjects such as electricity, blueprint reading, and safety. A high school diploma usually is required. Vocational education courses in electrical construction are useful, as are high school courses in electricity, physics, mathematics, and science. Many cities and counties require electricians to be licensed. To obtain a license, an applicant must pass a written examination and may have to demonstrate occupational skills.

Employment, 1976	300,000
Projected employment, 1985	370,000
Percent growth, 1976-85	23.3
Average annual openings, 1976-85	15,900
Growth	7,800
Replacement	8,100
Available training data:	
Private vocational education completions	100
Job Corps completions	29
Apprenticeship completions	1,106

Piano and organ tuners and repairers. Most workers learn their trade on the job. Generally, 3 to 4 years of on-the-job training are needed to qualify as a piano, pipe organ, or electronic organ technician, although piano tuning alone may be learned in less than 2 years. Employers prefer high school graduates for beginning jobs in these fields. Music courses are helpful in developing an ear for tonal quality and woodworking courses also are useful because many moving parts in pianos and pipe organs are made of wood. Electronic organ technicians usually need formal training in electronics available in technical schools, junior colleges, and some vocational schools. Courses in piano technology are offered by a small number of technical schools and by a few 4-year colleges. Home study (correspondence school) courses in piano technology also are available.

Employment, 1976	8,000
Projected employment, 1985	8,400
Percent growth, 1976-85	4.9
Average annual openings, 1976-85	650
Growth	50
Replacement	600
Available training data	

Shoe repairers. These workers generally start as helpers and are trained on the job in shoe repair shops. It usually takes about 2 years to learn all aspects of the job. Some repairers learn the trade in vocational schools, but additional training under an experienced shoe repairer generally is helpful. A high school diploma is not required. Business courses are useful because many shoe repairers own their own shops. Some high schools and junior colleges offer courses in shoe repair.

Employment, 1976	25,000
Projected employment, 1985	24,000
Percent change, 1976-85	-4.0
Average annual openings, 1976-85	1,800
Decline	-100
Replacement	1,900
Available training data	-

Television and radio service technicians. Employers usually hire persons who have had formal training in electronics while in high school, vocational school, technical school, or in the Armed Forces. Generally, 2 to 4 years of on-the-job training are necessary to become skilled in most types of repair work. Persons who do not have formal training but have an aptitude for the work or have worked with radios and televisions as a hobby may be hired as helpers. A high school diploma is preferred but not required.

Employment, 1976	114,000
Projected employment, 1985	150,000
Percent growth, 1976-85	31.1
Average annual openings, 1976-85	6,700
Growth	4,000
Replacement	2,700
Available training data:	
Private vocational education completions	1,500
Job Corps completions	33
Apprenticeship completions	108

Truck mechanics and bus mechanics. Most mechanics learn their skills on the job in 3 to 4 years, but completion of a 4-year apprenticeship program is the recommended way to learn this trade. These programs combine on-the-job training with classroom instruction in mathematics, physics, and shop safety. A high school diploma is preferred by employers and strongly recommended for applicants for apprenticeships. High school or vocational school courses in automobile repair and mathematics provide good preparation. For some jobs that require driving, mechanics must have a chauffeur's license. Employers also may require mechanics who drive to meet the qualifications of age, eyesight, and physical condition established by the U.S. Department of Transportation.

Employment, 1976	145,000
Projected employment, 1985	180,000
Percent growth, 1976-85	20.8
Average annual openings, 1976-85	6,900
Growth	3,400
Replacement	3,500
Available training data	-

Watch repairers. Most repairers learn their trade through 18- to 24-month courses offered by watch repair schools. Others learn informally on the job in about 3 years, or through a 3- to 4-year apprenticeship. Courses in watch repair cover use and care of tools and machines, how to take apart and reassemble various types of watches, and solving repair problems. A high school diploma is preferred. A few States require watch repairers to be licensed; to obtain a license applicants must pass a written test and a bench examination. Business courses may be useful to individuals who wish to open their own watch repair shops.

Employment, 1976	21,000
Projected employment, 1985	23,000
Percent growth, 1976-85	9.5
Average annual openings, 1976-85	1,500
Growth	200
Replacement	1,300
Available training data	-

Health Occupations

Dental occupations

Dentists. All States require dentists to have a license to practice. To be licensed, candidates must graduate from a dental school approved by the American Dental Association and pass a State board examination. Most States' licenses permit dentists to engage in both general and specialized practice. However, 14 States require specialists to have 2 or 3 years of graduate education and pass a State examination on the specialty. Dental school training generally lasts 4 academic years, although some institutions condense it into 3 calendar years. Applicants to dental school must have 2 to 4 years of college education, including courses in the sciences and humanities. In 1976, about 4 out of 5 students in dental school had a bachelor's or master's degree.

Employment, 1976	112,000
Projected employment, 1985	135,000
Percent change, 1976-85	20.8
Average annual openings, 1976-85	4,800
Growth	2,600
Replacement	2,200

Available training data:

	1975-76	*Projected 1976-85 (annual average)*
Dental school graduates...	5,425	5,340

Dental assistants. Most dental assistants learn their skills on the job, but an increasing number are trained through post-high school programs offered in junior and community colleges, and in vocational and technical schools. These programs generally take 1 year to complete and lead to a certificate or diploma. Graduates of 2-year programs offered in junior and community colleges earn an associate degree. Training also is available in the Armed Forces. Individuals who have had formal training generally have an advantage when seeking a job. A high school diploma is required, and courses in biology, chemistry, health, and typing are helpful.

Employment, 1976	135,000
Projected employment, 1985	200,000
Percent growth, 1976-85	51.1
Average annual openings, 1976-85	13,500
Growth	7,600
Replacement	5,900

Available training data:

Public vocational education completions	5,883
Private vocational education completions	5,000
Job Corps completions	39
Junior college graduates	1,425

Dental hygienists. Completion of an associate degree program usually is sufficient training to practice in a dentist's office. To do research, teach, and work in public or school health programs, at least a bachelor's degree is required. Dental hygienists must be licensed and only graduates of the associate or bachelor's degree programs of accredited dental hygiene schools are eligible for licensing. To obtain a license, applicants must pass both a written and a practical examination. Dental hygiene training given in the Armed Forces does not fully prepare one to pass the licensing examination, but credit for that training may be granted to persons seeking admission to accredited schools. High school courses in biology, health, chemistry, and mathematics are useful.

Employment, 1976	27,000
Projected employment, 1985	60,000
Percent growth, 1976-85	121.9
Average annual openings, 1976-85	5,100
Growth	3,600
Replacement	1,500

Available training data:

Public vocational education completions	1,378
Junior college graduates	3,538
Degrees in dental hygiene:	
Bachelor's degrees	1,115
Master's degrees	24
Doctor's degrees	16

Dental laboratory technicians. Many dental laboratory technicians learn their skills on the job, usually in 4 to 5 years. A few vocational schools offer courses in dental laboratory work. High school graduates are preferred, and courses in art, crafts, metal shop, metallurgy, and science are helpful. Persons who receive dental laboratory training in the Armed Forces usually qualify for civilian jobs as technicians.

In 1976, 48 junior colleges, colleges, and vocational and technical schools offered training programs accredited by the American Dental Association. After completion of these 2-year programs, the trainee may need about 3 years of experience to become a fully qualified technician. Dental laboratory technicians may become certified dental technicians by passing written and practical examinations given by the National Association of Dental Laboratories. Certification is becoming increasingly important as evidence of a technician's competence.

Employment, 1976	42,000
Projected employment, 1985	62,000
Percent growth, 1976-85	48.3
Average annual openings, 1976-85	3,700
Growth	2,200
Replacement	1,500

Available training data:

Public vocational education completions	844
Private vocational education completions	600
Apprenticeship completions	138
Junior college graduates	622

Medical practitioners

Chiropractors. All States require chiropractors to meet certain educational requirements and pass a State board examination for a license. Although the type of chiropractic procedures permitted and education required vary, most States require graduation from a 4-year chiropractic course following 2 years of undergraduate college work.

Enrollments in chiropractic colleges have grown dramatically. As more students graduate and the number of practitioners swells, new chiropractors may find it increasingly difficult to establish a practice in those areas where chiropractors already are located.

Employment, 1976	18,000
Projected employment, 1985	21,600
Percent growth, 1976-85	20.0
Average annual openings, 1976-85	1,600
Growth	400
Replacement	1,200

Available training data:

Chiropractic school graduates	1,577

Optometrists. All States require optometrists to be licensed. Applicants for a license must have a Doctor of Optometry degree from an accredited school of optometry and pass a State board examination. The Doctor of Optometry degree requires a minimum of 6 years of education after high school, consisting of 4 years of optometry school preceded by at least 2 years of undergraduate college study. In 1976, the American Optometric Association accredited 12 schools.

Employment opportunities are expected to be favorable through the mid-1980's. About 1,500 new optometrists will be needed annually, although the U.S. Public Health Service projects an average of 1,000 optometry graduates each year.

Employment, 1976	19,700
Projected employment, 1985	23,000
Percent growth, 1976-85	16.8
Average annual openings, 1976-85	1,500
Growth	400
Replacement	1,100

Available training data:

Optometry school graduates	975

Physicians and osteopathic physicians. All States require a license for the practice of medicine. Applicants for a license must graduate from an approved medical school or school of osteopathy, pass a State board examination, and in many States, serve a 1-year hospital residency. Most students who enter medical school or a school of osteopathy have earned a bachelor's degree, although many schools accept students who have had just 3 years of college. No one college major is best. A major in one of the sciences, or a major in the humanities with extra course work in the sciences, is good preparation. Most medical schools and schools of osteopathy have 5-year curriculums. Persons who wish to specialize must complete "advanced residency training" usually followed by 2 or more years of practice in the specialty before they may take the specialty board examinations.

The employment outlook for physicians and osteopathic physicians is expected to be very good. Over the 1976-85 period, about 1,000 foreign medical graduates are expected to enter the country annually, and about 17,100 students are projected to graduate from U.S. medical schools each year, according to the U.S. Public Health Service. This number is somewhat lower than the 21,800 new physicians and osteopathic physicians expected to be needed annually.

Employment, 1976	375,000
Projected employment, 1985	520,000
Percent growth, 1976-85	37.8
Average annual openings, 1976-85	21,800

Growth	16,000
Replacement	5,800

Available training data:

	1975-76	*Projected 1976-85 (annual average)*
M.D. degrees	[1] 14,163	[1] 15,997
D.O. degrees	[1] 806	[1] 1,128

[1] U.S. Public Health Service data.

Podiatrists. All States require a license for the practice of podiatry. Applicants for a license must graduate from an accredited 4-year program in a college of podiatric medicine and pass a State board examination. Four States also require serving a 1-year residency. At least 2 years of college are required for admission to any of six colleges of podiatric medicine. Most successful applicants to schools of podiatry in 1976 had bachelor's degrees. No one college major is required.

Opportunities for graduates to establish new practices or obtain salaried positions are expected to be favorable. It is anticipated that an average of 500 podiatrists will be needed each year, while projections of new graduates developed by the U.S. Public Health Service indicate that 450 podiatrists will graduate annually.

Employment, 1976	7,500
Projected employment, 1985	8,700
Percent change, 1976-85	15.1
Average annual openings, 1976-85	500
Growth	100
Replacement	400

Available training data:

	1975-76	*Projected 1976-85 (annual average)*
Podiatry school graduates	439	[1] 450

[1] U.S. Public Health Service data.

Veterinarians. A license is required to practice veterinary medicine in all States. To be licensed a candidate must earn the Doctor of Veterinary Medicine (D.V.M.) degree, pass a State board examination, and in some States have some practical experience.

Four years of study in a college of veterinary medicine preceded by at least 2 years of undergraduate education are required to earn the D.V.M. degree. Applicants for admission to veterinary colleges must have completed 2 to 3 years of study in a program that emphasizes the physical sciences. Most students, however, have completed 3 to 4 years of college study.

Employment opportunities are expected to be favorable through the mid-1980's. About 1,800 new veterinarians will be needed annually, while the U.S. Public Health Service projects an average of 1,700 students will graduate each year.

Employment, 1976	30,500
Projected employment, 1985	39,500
Percent growth, 1976-85	27.0
Average annual openings, 1976-85	1,800
Growth	900
Replacement	900

Available training data:

	1975-76	*Projected 1976-85 (annual average)*
Veterinary school graduates	1,532	[1] 1,700

[1] U.S. Public Health Service data.

Medical technologist, technician, and assistant occupations

Electrocardiograph (EKG) technicians. Generally, EKG technicians are trained on the job for 3 months to 1 year by an EKG supervisor or a cardiologist. Vocational schools in several States and junior colleges give college credit for courses in cardiology technology, and some colleges offer associate degrees in the field. A high school diploma is required, and courses in health, biology, and typing are helpful.

Employment, 1976	12,000
Projected employment, 1985	15,000
Percent growth, 1976-85	28.8
Average annual openings, 1976-85	700
Growth	400
Replacement	300

Available training data:

Private vocational education completions	200
Job Corps completions	28
Junior college graduates	[1] 66

[1] Includes all electrodiagnostic technicians.

Electroencephalographic (EEG) technicians. Most EEG technicians and technologists are trained on the job by experienced EEG personnel. Training authorities, however, recommend completion of a 6-month program approved by the American Medical Association (AMA) for technicians, and completion of a 1- to 2-year program for technologists. Programs may be offered in colleges, junior colleges, medical schools, hospitals, and vocational or technical schools. In 1976, only 9 AMA-approved programs existed, however. High school graduation is required, and courses in health, biology, and electronics are helpful.

EEG personnel who have 1 year of training and 1 year of experience and pass a written and oral examination administered by the American Board of Registration of Electroencephalographic Technologists can become "Registered EEG Technologists." Registration is not a requirement for employment, but is acknowledgement of a technologist's qualifications and makes it easier to obtain better paying positions.

Employment, 1976	4,300
Projected employment, 1985	5,500
Percent change, 1976-85	31.0
Average annual openings, 1976-85	300
Growth	150
Replacement	150

Available training data:

Junior college graduates	[1] 66

[1] Includes all electrodiagnostic technicians.

Emergency medical technicians (EMT's). Few EMT's received formal training until recent years. Now instruction in emergency medical care techniques is mandatory. A standard training course is the 81-hour program designed by the U.S. Department of Transportation. This program or its equivalent is offered in all States by police, fire, and health departments; in hospitals; and in medical schools, colleges and universities. A high school diploma and a valid driver's license are required for entrance into a training program. High school courses in health and science and driver education are recommended. Training in the Armed Forces as a "medic" also is good preparation. Physical strength and coordination are required.

Employment, 1976	287,000
Projected employment, 1976	500,000
Percent growth, 1976-85	74.2
Average annual openings, 1976-85	37,000
Growth	24,000
Replacement	13,000
Available training data	

Medical laboratory workers. There are 3 occupations within this group—medical laboratory assistant, medical laboratory technician, and medical technologists. Most *medical laboratory assistants* are trained on the job. In recent years, however, an increasing number have completed 1-year training programs conducted by hospitals, junior colleges, and vocational schools. Applicants to these programs must have a high school diploma with courses in science and mathematics.

Medical laboratory technicians may obtain training through 2-year programs offered by junior colleges, colleges and universities, and vocational and technical schools. Some are trained in the Armed Forces. *Medical technologists* usually must complete 4 years of college, including 12 months of study and extensive laboratory work in medical technology. About 700 hospitals and colleges and universities offered programs accredited by the American Medical Association. A bachelor's degree usually is awarded upon completion, although a few programs require a bachelor's degree for entry.

Employment, 1976	240,000
Projected employment, 1985	350,000
Percent growth, 1976-85	45.8
Average annual openings, 1976-85	20,000
Growth	12,000
Replacement	8,000

Available training data:

Public vocational education completions	4,721
Private vocational education completions	2,400
Job Corps completions	17
Junior college graduates	3,313
Degrees in medical laboratory technologies:	
Bachelor's degree	5,389
Master's degree	241

Medical record technicians and clerks. High school graduates who have basic secretarial skills can enter the medical record field as clerks. About 1 month of on-the-job training is needed to learn routine tasks. Although not required, high school courses in science, health, and mathematics are helpful. The American Medical Record Association (AMRA) offers a correspondence course in medical transcription; the certificate awarded upon successful completion of the course is helpful in applying for a job as a clerk.

Most employers prefer to fill technician positions with graduates of 2-year associate degree programs in medical record technology. In 1977, the American Medical Association and the AMRA had accredited 66 programs. Technicians may take the Accredited Record Technician (ART) examination. Passing the examination indicates competence in the field and can be helpful for promotion.

Employment, 1976	57,000
Projected employment, 1985	106,000
Percent growth, 1976-85	86.0
Average annual openings, 1976-85	9,000
Growth	5,400
Replacement	3,600

Available training data:

Job Corps completions	62
Junior college graduates	919

Operating room technicians. Most operating room technicians are trained in vocational and technical schools, hospitals, and community and junior colleges. Generally these programs last from 9 months to 1 year, but some junior college programs last 2 years and lead to an associate degree. Some technicians are trained on the job. The length of training ranges from 6 weeks to 1 year, depending on the individual's qualifications and the extent and difficulty of the work assigned. Applicants who have worked as nursing aides or practical nurses may be preferred. Some operating room technicians are trained in the Armed Forces, also. A high school diploma generally is required, and courses in health and biology are helpful.

The Association of Operating Room Technicians awards a certificate to operating room technicians who pass its comprehensive examination. This certification is recognized as a sign of competence and generally commands a higher salary.

Employment, 1976	30,000
Projected employment, 1985	41,000

Percent growth, 1976-85	34.4
Average annual openings, 1976-85	2,100
Growth	1,200
Replacement	900

Available training data:

Public vocational education completions	1,106
Junior college graduates	252

Optometric assistants. Most optometric assistants are trained on the job, but training also can be acquired through 1- or 2-year courses in junior colleges. A high school diploma or its equivalent, including knowledge of mathematics and office procedures, is preferred for both on-the-job and formal training.

Employment, 1976	11,800
Projected employment, 1985	15,300
Percent growth, 1976-85	29.5
Average annual openings, 1976-85	700
Growth	400
Replacement	300

Available training data:

Junior college graduates	519

Radiologic (X-ray) technologists. Completion of a 2-year training program in X-ray technology is required for entry to the field. These programs are offered in hospitals, medical schools, colleges, junior colleges, vocational schools, and the military services. A few schools conduct 3- or 4-year programs, and some schools award bachelor's and master's degrees in X-ray technology. Generally, there is more potential for advancement for persons who hold bachelor's or master's degrees. High school graduation is required for entry to all training programs, and courses in mathematics, physics, chemistry, and biology are helpful.

Although the demand for radiologic technologists should continue to be strong, the number of graduates of AMA-approved programs in this field is expected to grow rapidly through the mid-1980's. If present enrollment patterns continue, the number seeking to enter the occupation is likely to exceed the number of openings. As a result, graduates may face competition for positions of their choice.

Employment, 1976	80,000
Projected employment, 1985	112,000
Percent growth, 1976-85	39.9
Average annual openings, 1976-85	6,300
Growth	3,600
Replacement	2,700

Available training data:

Public vocational education completions	1,847
Private vocational education completions	3,000
Junior college graduates	3,323

Degrees in radiologic technologies:

Bachelor's degrees	263
Master's degrees	26
Doctor's degrees	4

Respiratory therapy workers. There are three levels of workers–assistants, technicians, and therapists. *Assistants* trained on the job learn their skills in about 6 weeks. A high school diploma is not required, but may be preferred by some employers. Formal training beyond high school is required for technicians and therapists. Programs are offered in colleges and universities, junior colleges, and hospitals. Generally *technician* training programs last 12 months, while *therapist* training programs last 18 to 24 months. Therapists completing the 2-year program at a college earn an associate degree. Some colleges and universities offer 4-year programs for therapists that culminate in a bachelor's degree. High school courses in health, biology, mathematics, physics, and bookkeeping are useful preparation for these occupations.

The National Board of Respiratory Therapy awards the Registered Respiratory Therapist (RRT) and Certified Respiratory Therapy Technician (CRTT) credentials to individuals who meet their requirements. To earn the RRT, therapists must complete an approved training program, have 62 semester hours of college credit, 1 year of experience, and pass written and oral examinations. To earn the CRTT, technicians must complete an approved training program, have 1 year of experience, and pass a written test.

Employment, 1976	36,000
Projected employment, 1985	65,000
Percent growth, 1976-85	80.6
Average annual openings, 1976-85	4,700
Growth	3,200
Replacement	1,500

Available training data:

Public vocational education completions	1,707
Job Corps completions	5
Junior college graduates	2,080

Nursing occupations

Registered nurses. All States require professional nurses to be licensed. Applicants for a license must graduate from a school approved by the State board of nursing and pass the State board examination. All nursing schools require a high school diploma for entry. Programs vary in length from 2 to 5 years. Nurses who complete 2-year courses earn associate degrees; those who complete 3-year courses earn diplomas; and bachelor's degrees are awarded to graduates of 4- and 5-year courses. A master's degree is preferred for research, consultation, teaching, and clinical specialization.

Employment opportunities are expected to be favorable through the mid-1980's. Between 1976 and 1985, an average of 83,000 new registered nurses will be needed annually. The U.S. Public Health Service projects that the average number of graduates each year will approximate this demand. Traditionally, not all graduates have entered nursing immediately upon graduation, however, and many have left the labor force early in their careers. Thus, a substantial pool of qualified nurses exists outside the labor force. Many nurses are expected to seek entry or re-entry into the field, but the number depends on many factors which are difficult to analyze, such as the availability of jobs in specific localities, general economic conditions, and job opportunities and salaries in other occupations for which nurses are qualified.

Employment, 1976	960,000
Projected employment, 1985	1,320,000
Percent growth, 1976-85	37.6
Average annual openings, 1976-85	83,000
Growth	40,000
Replacement	43,000

Available training data:

Public vocational education completions	[1] 16,740
Private vocational education completions	[1] 1,000
Junior college graduates	[1] 34,187
Degrees in nursing:	
Bachelor's degrees	26,726
Master's degrees	3,035
Doctor's degrees	16

[1] Some graduates may be counted in both junior college and vocational education programs.

Licensed practical nurses. All States require applicants for licenses as practical nurses to complete a State-approved course in practical nursing and pass an examination. Educational requirements for enrollment in these courses vary by State and range from completion of eighth or ninth grade to high school graduation. Generally, the course lasts 1 year and is given in junior colleges, local hospitals, health agencies, and vocational schools.

Employment, 1976	460,000
Projected employment, 1985	710,000
Percent growth, 1976-85	54.3
Average annual openings, 1976-85	53,000
Growth	28,000
Replacement	25,000

Available training data:

Public vocational education completions	36,759
Private vocational education completions	3,400
Job Corps completions	66
Junior college graduates	2,794

Nursing aides, orderlies, and attendants. Although some employers prefer to hire high school graduates, a diploma is not required. Training usually is acquired on the job, often in combination with classroom instruction covering areas such as the correct procedures for changing bed linens, taking temperatures, and giving back rubs. Public and private vocational schools also offer this training.

Employment, 1976	1,000,000
Projected employment, 1985	1,350,000
Percent growth, 1976-85	36.2
Average annual openings, 1976-85	83,000
Growth	40,000
Replacement	43,000

Available training data:

Public vocational education completions	29,819
Private vocational education completions	4,100
Job Corps completions	1,790

Therapy and rehabilitation occupations

Occupational therapists. A bachelor's degree in occupational therapy generally is required to enter this profession. Some schools, however, offer programs leading to a certificate or a master's degree in occupational therapy for students who have a bachelor's degree in another field. Graduates of approved programs may take the American Occupational Therapy Association examination to become registered occupational therapists (OTR). This designation is recognition of professional competence.

The increasing number of graduates from training programs is likely to exceed the number of job openings through the mid-1980's. New graduates, therefore, may face competition for jobs in some geographic areas.

Employment, 1976	10,600
Projected employment, 1985	18,100
Percent growth, 1976-85	70.8
Average annual openings, 1976-85	1,300
Growth	900
Replacement	400

Available training data:

Degrees in occupational therapy:	
Bachelor's degrees	1,453
Master's degrees	166

Occupational therapy assistants. Most occupational therapy assistants are trained on the job in hospitals and other health care facilities. Some learn their skills in vocational and technical programs. Other assistants graduate from 1- or 2-year junior college programs or complete an approved occupational therapy assistant program in the Armed Forces. Applicants for training programs must have a high school diploma or its equivalent.

Employment, 1976	8,900
Projected employment, 1985	16,300
Percent growth, 1976-85	83.1
Average annual openings, 1976-85	1,200
Growth	800
Replacement	400

Available training data:

Junior college graduates	560

Physical therapists. All States require physical therapists to be licensed. Applicants for a license must have a bachelor's degree in physical therapy and pass a State board examination. For persons who have bachelor's degrees in other fields, 12- to 16-month certficate programs and 2-year master's degree programs are available. A graduate degree combined with clinical experience increases advancement opportunities, especially in teaching, research, and administration.

The rapidly growing number of new graduates is expected to exceed the number of openings that will occur each year in this occupation. As a result, new graduates are expected to face some competition through the mid-1980's.

Employment, 1976	25,000
Projected employment, 1985	36,000
Percent growth, 1976-85	44.8
Average annual openings, 1976-85	2,100
Growth	1,200
Replacement	900

Available training data:

Degrees in physical therapy:	
Bachelor's degrees	2,060
Master's degrees	167
Doctor's degrees	1

Physical therapist assistants and aides. Some States now license physical therapist assistants. To obtain a license, applicants must complete an approved 2-year associate degree program. A few States, however, license those who learned their skills before the associate degree programs became available. States which do not require licensing allow physical therapist aides to advance to assistants by acquiring the necessary knowledge and skills on the job, but employers often prefer to hire graduates of approved programs for assistant jobs.

Physical therapist aides train on the job. The length and content of these training programs depends on the difficulty of the duties aides are expected to perform and the needs of the patients in the particular program. Employers generally prefer to hire high school graduates who have worked as hospital nursing aides. High school courses in health, biology, psychology, and physical education are useful preparation for both aides and assistants.

Employment, 1976	12,500
Projected employment, 1985	18,000
Percent growth, 1976-85	44.0
Average annual openings, 1976-85	1,100
Growth	600
Replacement	500

Available training data:

Private vocational education completions	([1])
Job Corps completions	19
Junior college graduates	749

[1] Less than 50.

Speech pathologists and audiologists. Most States prefer and some require applicants for beginning jobs in public schools to have a master's degree. In addition, a teacher's certificate often is required and some States insist that workers who deal with handicapped children have special training. Many Federal programs, such as Medicare and Medicaid, require participating speech pathologists and audiologists to have a master's degree.

Competition for jobs in many areas of the country is expected to be keen. Over the 1976-85 period, an average of 2,900 new speech pathologists will be needed each year. Graduates of master's degree programs alone are expected to exceed that number, and a number of bachelor's degree holders also will compete for jobs. Some rural and inner-city jobs have been difficult to fill, however, so opportunities for master's degree holders who are willing to work in these areas should be favorable.

Employment, 1976	38,000
Projected employment, 1985	53,500
Percent growth, 1976-85	39.2
Average annual openings, 1976-85	2,900
Growth	1,700
Replacement	1,200

Available training data:

Degrees in speech pathology and audiology:	
Bachelor's degrees	3,925
Master's degrees	3,119
Doctor's degrees	109

Other health occupations

Dietitians. A bachelor's degree, preferably with a major in foods and nutrition or institution management, is the basic educational requirement. This degree usually is earned through departments of home economics. To qualify for professional recognition, the American Dietetic Association recommends completion of an approved dietetic internship or an approved individual traineeship program following graduation. The internship lasts 6 to 12 months and the traineeship program 1 to 2 years. A growing number of programs enable students to complete all requirements in 4 years.

Employment, 1976	45,000
Projected employment, 1985	52,000
Percent change, 1976-85	15.6
Average annual openings, 1976-85	2,800
Growth	800
Replacement	2,000

Available training data:

Degrees in foods and nutrition:	
Bachelor's degrees	2,767
Master's degrees	526
Doctor's degrees	57

Dispensing opticians. Most dispensing opticians learn their

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skills on the job. Employers prefer high school graduates, and graduation is required for formal training programs. Some dispensing opticians learn their skills through 3- to 4-year apprenticeship programs that teach optical mathematics, optical physics, and the use of laboratory equipment. Apprentices also are taught to fit patients with eyeglasses and contact lenses. High school courses in geometry, algebra, and mechanical drawing are useful.

A small number of schools offer post-high school training that leads to an associate degree in optical fabricating and dispensing work. In 1976, 19 States required dispensing opticians to be licensed. Applicants for a license must pass an examination.

Employment, 1976	14,500
Projected employment, 1985	21,100
Percent growth, 1976-85	46.5
Average annual openings, 1976-85	1,300
Growth	800
Replacement	500

Available training data:

Apprenticeship completions	140
Junior college graduates	519

Health services administrators. Educational requirements for health administrators vary. A master's degree in hospital and health care administration or in public health sometimes is required; however, some employers hire persons who have other backgrounds. A few hospitals and clinics require administrators to be physicians or registered nurses.

Employment, 1976	160,000
Projected employment, 1985	230,000
Percent growth, 1976-85	45.0
Average annual openings, 1976-85	16,000
Growth	8,000
Replacement	8,000

Available training data:

Degrees in hospital and health care administration:

Bachelor's degrees	421
Master's degrees	1,129
Doctor's degrees	11

Medical record administrators. Preparation for a career as a medical record administrator is offered in specialized 4-year programs in colleges and universities. Most programs lead to a bachelor's degree in medical record administration. Some persons transfer into these programs from junior colleges. One-year certificate programs are available for persons who already have a bachelor's degree and the required courses in the liberal arts and biological sciences. High school courses in health, business administration, mathematics, and biology are useful.

Graduates of approved schools in medical record administration may become Registered Record Administrators by passing an examination given by the American Medical Record Association.

Employment, 1976	12,300
Projected employment, 1985	15,600
Percent growth, 1976-85	26.6
Average annual openings, 1976-85	1,000
Growth	400
Replacement	600

Available training data:

Degrees in medical record librarianship:

Bachelor's degrees	521

Pharmacists. All States require pharmacists to be licensed. To obtain a license, one must graduate from an accredited pharmacy college, pass a State Board examination, and usually have a specified amount of practical experience or period of internship under a registered pharmacist. For entry to a college of pharmacy, at least 1 or 2 years of prepharmacy education in an accredited junior college, college, or university usually is required. At least 5 years of study beyond high school are required to graduate from one of the degree programs accredited by the American Council on Pharmaceutical Education in the 72 colleges of pharmacy. Most graduates receive a Bachelor of Science (B.S.) or Bachelor of Pharmacy (B. Pharm) degree. About one-third of the colleges offer advanced professional degree programs leading to the Doctor of Pharmacy (Pharm. D.) degree; 3 schools offer only the Pharm. D. degree. The Pharm. D. or a master's degree or Ph. D. degree in pharmacy is required for certain research, administrative, or teaching positions. Some pharmacists enter medical, dental, or law school, or pursue graduate degrees in science or engineering.

If the number of pharmacy college graduates continues to rise as rapidly as it has in recent years, the current favorable outlook for graduates may change, and the job market may become increasingly competitive. Job prospects vary within the profession. Although community pharmacies will continue to be the primary employer of pharmacists; employment of these workers is expected to rise fastest in hospitals, nursing homes, and other health facilities. Pharmacists in these settings increasingly provide direct patient care and consultative services to physicians and other professionals.

Employment, 1976	120,000
Projected employment, 1985	140,000
Percent growth, 1976-85	16.4
Average annual openings, 1976-85	8,900
Growth	2,200
Replacements	6,700

Available training data:

Degrees in pharmacy:

Bachelor's degrees	6,869
Master's degrees	307
Doctor's degrees	81

Social Scientists

Anthropologists. A Ph. D. degree in anthropology usually is necessary to become an anthropologist, especially if one seeks a permanent college teaching position. A master's degree, plus field experience, is sufficient for many beginning jobs in business and government, but advancement generally is limited.

The number of persons seeking to enter the field is expected to exceed available positions. As a result, persons who have a Ph. D. degree may face keen competition, particularly for college and university teaching positions. Master's and bachelor's degree holders are likely to face even greater competition, although some may find research or administrative positions in government and industry, or teaching jobs in junior colleges or high schools.

Employment, 1976	3,500
Projected employment, 1985	4,300
Percent growth, 1976-85	22.4
Average annual openings, 1976-85	200
Growth	100
Replacement	100

Available training data:

Degrees in anthropology:

	1975-76	*Projected 1976-85 (annual average)*
Bachelor's degrees	5,180	6,847
Master's degrees	937	1,391
Doctor's degrees	419	647

Economists. A bachelor's degree in economics is sufficient for many beginning jobs in government and industry, but a master's degree may be required for more responsible research and administrative positions. A Ph. D. degree generally is required for permanent teaching positions in colleges and universities and is an asset for advancement in all areas.

Persons who have Ph. D. degrees are likely to face competition for academic positions, but should find favorable prospects in government, industry, research organizations, and consulting firms. Master's degree holders may face keen competition for academic positions, but may find good opportunities for administrative, research, and planning positions in government and industry. Bachelor's degree holders are expected to face very strong competition for jobs as economists, although some may find employment in government, industry, and business as management or sales trainees, or as research assistants.

Employment, 1976	115,000
Projected employment, 1985	148,000
Percent growth, 1976-85	27.4
Average annual openings, 1976-85	6,400
Growth	3,500
Replacement	2,900

Available training data:

Degrees in economics:

	1975-76	*Projected 1976-85 (annual average)*
Bachelor's degrees	14,741	11,715
Master's degrees	2,087	2,273
Doctor's degrees	763	766

Geographers. A bachelor's degree in geography is the minimum educational requirement for beginning jobs in government and industry, but a master's degree may be required for advancement. A Ph. D. degree generally is necessary for permanent teaching positions in colleges and universities, and for some senior level research, planning, and administrative positions.

A growing number of jobs are expected to require knowledge of cartography, climatology, and remote sensing. Government will need geographers to work in health services planning, environmental management, community and regional development, and intelligence. Private industry will need geographers for market research and location analysis.

Persons who have a Ph. D. degree are expected to face competition for academic positions, but should have favorable prospects for research and administrative jobs in government, industry, research organizations, and consulting firms. Master's degree holders may face strong competition for academic positions, but should find job opportunities in planning and marketing in government and industry. Bachelor's degree holders are likely to face competition for jobs as geographers. Some may find jobs as cartographers, climatologists, or intelligence analysts. Others may find employment as management trainees or research or administrative assistants. As in the past, bachelor's degree holders also may become secondary school teachers, or earn library science degrees and become map librarians.

Employment, 1976	10,000
Projected employment, 1985	12,500
Percent growth, 1976-85	25.3
Average annual openings, 1976-85	600
Growth	300
Replacement	300

Available training data:

Degrees in geography:

	1975-76	*Projected 1976-85 (annual average)*
Bachelor's degrees	3,733	4,002
Master's degrees	665	777
Doctor's degrees	168	243

Historians. Graduate education usually is necessary for employment as an historian. Although a master's degree is sufficient for some positions, advancement opportunities may be quite limited for persons who do not have a Ph. D. degree. A Ph. D. is required for permanent teaching positions in colleges and universities and for many research and administrative jobs.

Only a small number of historians will be needed to fill positions in colleges and universities, junior colleges, libraries, archives, museums, secondary schools, research organizations, publishing firms, and government agencies. Those who have training in a specialty, such as historic preservation, and those trained in quantitative methods are expected to have the best opportunities. Persons who are able to teach several areas of history should have the best prospects for jobs in colleges and universities.

Although information on patterns of entry to the field is limited, available data indicate that the number of persons expected to seek jobs as historians will greatly exceed available positions. Ph. D's are expected to face keen competition, particularly for academic positions, and many may have to accept part-time, temporary assignments. Master's degree holders may face even greater competition for jobs as historians, although some may find teaching positions in community colleges or high schools. Persons who have bachelor's degrees are likely to find very limited job opportunities in the field. A major in history, however, provides an excellent background for some jobs in international relations, journalism, and other areas, and for continuing education in law, business, and other disciplines. Some graduates will find jobs as secondary school teachers, as management or sales trainees, or as research or administrative assistants.

Employment, 1976	22,500
Projected employment, 1985	24,500
Percent growth, 1976-85	9.1
Average annual openings, 1976-85	900
Growth	200
Replacement	700

Available training data:

Degrees in history:

	1975-76	*Projected 1976-85 (annual average)*
Bachelor's degrees	28,400	23,229
Master's degrees	3,658	4,154
Doctor's degrees	1,014	960

Political scientists. Graduate training generally is required for employment as a political scientist. A Ph. D. degree normally is necessary for permanent teaching positions in colleges and universities and is helpful for advancement in nonacademic areas. Individuals who have master's degrees often qualify for various administrative and research jobs in government, industry, and in nonprofit research or civic organizations.

The number of persons seeking to enter this field is expected to greatly exceed the number of available positions. Ph. D's may face stiff competition, particularly for academic positions, and many are expected to accept part-time, temporary assignments. Graduates who are trained in quantitative methods, American government, public administration, or policy science may have the most favorable opportunities for academic and nonteaching jobs. Competition for foreign service positions is expected to remain very keen.

Master's degree holders are likely to face very stiff competition for academic jobs, but those who have specialized training in areas such as public administration or policy science may find jobs in government, research organizations, political organizations, and business firms. Bachelor's degree holders are expected to find limited opportunities for jobs as political scientists. Some graduates, however, may find jobs as trainees in government, business, and industry. As in the past, many are expected to continue their studies in areas such as law, journalism, foreign affairs, and other fields.

Employment, 1976	14,000
Projected employment, 1985	15,300
Percent growth, 1976-85	7.0
Average annual openings, 1976-85	400
Growth	100
Replacement	300

Available training data:

Degrees in political science and government:

	1975-76	*Projected 1976-85 (annual average)*
Bachelor's degrees	28,302	24,396
Master's degrees	2,191	2,506
Doctor's degrees	723	797

Psychologists. A doctoral degree in psychology generally is the minimum educational requirement for employment as a psychologist. It is needed for many beginning positions and is increasingly important for advancement. The Ph. D. degree culminates in a dissertation, whereas the Psy. D. (Doctor of Psychology) is based on practical work experience and examinations. Master's and bachelor's degree holders are qualified for jobs as assistants.

As of late 1976, the District of Columbia and all States except Missouri had certification or licensing requirements for psychologists who wanted to enter independent practice. The requirements generally include a doctorate in psychology, 2 years of professional experience, and successful completion of a written examination.

The American Board of Professional Psychology awards diplomas in clinical, counseling, industrial and organizational, and school psychology. Requirements generally include a doctorate in psychology, 5 years of qualifying experience, professional endorsement, and successful completion of a written examination.

Persons who have doctoral degrees are expected to face increasing competition for jobs, particularly for academic positions in large colleges and universities. Prospects should be better in smaller and newer institutions. Persons who have doctorates in applied areas, such as clinical, counseling, and industrial or organizational psychology are expected to have better opportunities than those trained in traditional academic specialties, such as experimental, physiological or comparative psychology. Master's degree holders are likely to face very stiff competition, particularly for academic positions. Some may find opportunities in government, industry, and human service organizations; training in applied areas such as evaluation research will be helpful in getting these jobs.

Some bachelor's degree holders may enter the field as trainees. For those who wish to continue their education in medicine, social work, sociology, law, counseling, recreation, gerontology, or related disciplines, psychology provides an excellent background.

Employment, 1976	90,000
Projected employment, 1985	120,000
Percent growth, 1976-85	33.8
Average annual openings, 1976-85	5,600
Growth	3,400
Replacement	2,200

Available training data:

Degrees in psychology:

	1975-76	*Projected 1976-85 (annual average)*
Bachelor's degrees...	49,908	53,462
Master's degrees......	7,811	9,799
Doctor's degrees......	2,581	3,433

Sociologists. A master's degree in sociology generally is the minimum educational requirement for employment as a sociologist. A Ph. D. degree usually is necessary for permanent teaching positions in colleges and universities, for jobs as directors of major research projects, administrators, or consultants.

The number of persons seeking to enter this field is likely to greatly exceed available job openings. Persons who have Ph. D. degrees face increasing competition, particularly for academic positions, and some may accept part-time, temporary jobs. Others may take research and administrative positions in government, industry, research organizations, and consulting firms. Master's degree holders may face very stiff competition, but some, particularly those who have strong training in quantitative research, statistical, and computer methods, may teach in junior colleges or find jobs in government agencies, research firms, and industry. Bachelor's degree holders are expected to find their job opportunities as sociologists very limited. As in the past, some may become administrative or research assistants, while others may continue their studies in law, journalism, social work, recreation, counseling, and related disciplines.

Employment, 1976	19,000
Projected employment, 1985	21,700
Percent growth, 1976-85	14.5
Average annual openings, 1976-85	800
Growth	300
Replacement	500

Available training data:

Degrees in sociology:

	1975-76	*Projected 1976-85 (annual average)*
Bachelor's degrees...	27,634	27,098
Master's degrees......	2,009	2,306
Doctor's degrees......	729	794

Social Service Occupations

Counseling occupations

School counselors. Most States require school counselors to have both counseling and teaching certificates, although an increasing number of States no longer require teaching certification. To obtain a teaching certificate, an individual must have a bachelor's degree from an institution with a State-approved teacher education program and complete basic education courses and student teaching. Depending on the State, graduate work and from 1 to 5 years of teaching experience usually are required for a counseling certificate.

Most undergraduate students interested in becoming school counselors take the regular program of teacher education with additional courses in psychology and sociology. In States that do not require teaching experience, students can major in any field. A few States substitute a counseling internship for teaching experience. One to two years of study are necessary to earn a master's degree in counseling.

Employment, 1976	43,000
Projected employment, 1985	45,900
Percent change, 1976-85	6.0
Average annual openings, 1976-85	1,500
Growth	300
Replacement	1,200

Available training data: ....

Other social science occupations

Cooperative extension service workers. These workers must have at least a bachelor's degree in the field in which they will conduct their educational program. Although one can specialize in a variety of areas, the most common are agriculture, home economics, youth activities, and community resource development. In addition, training in educational techniques and in a communications field, such as journalism, is helpful. Often workers receive instruction in extension work in pre-induction training programs and can improve their skills through regular in-service training programs.

Employment, 1976	16,000
Projected employment, 1985	18,000
Percent growth, 1976-85	12.5
Average annual openings, 1976-85	600
Growth	200
Replacement	400

Available training data ....

Home economists. A bachelor's degree in home economics is required for most entry positions in the field. A master's or doctor's degree is necessary for college teaching, for some research and supervisory positions, for work as an extension specialist, and for most jobs in nutrition. Advanced courses in chemistry and nutrition are important for work in foods and nutrition; science and statistics for research work; and journalism for advertising and public relations work. To teach home economics in high school, students must complete the courses required for a teaching certificate. High school courses in home economics, speech, health, mathematics, and chemistry are useful.

Individuals seeking jobs as home economists, especially those wishing to teach in high schools, will face keen competition for jobs through the mid-1980's. Other areas of home economics also will be competitive as those unable to find teaching jobs look for other positions. For those with an advanced degree, however, employment prospects in college and university teaching are expected to be good.

Employment, 1976	141,000
Projected employment, 1985	143,000
Percent growth, 1976-85	1.4
Average annual openings, 1976-85	6,100
Growth	200
Replacement	5,900

Available training data:

Degrees in home economics:

Bachelor's degrees	17,409
Master's degrees	2,179
Doctor's degrees	178

Homemaker-home health aides. Homemaker-home health aides need to be able to read and write, but high school graduation generally is not required. High school home economics courses, such as meal planning and family living, are helpful, however, particularly for young persons who have little personal experience in homemaking. Some employers hire only experienced nursing aides for jobs as homemaker-home health aides, and require at least a year's experience as a nursing aide in a hospital or nursing home.

As a rule, homemaker-home health aides undergo orientation and training after they are hired; the length and quality of this training vary, however. Agencies that insist on previous experience as a nursing aide may provide only a few hours of orientation. Most agencies, however, provide 1 or 2 weeks of training, including classroom instruction in topics such as nutrition, meal planning and preparation, personal care of the sick, emotional aspects of illness, and the aging process.

Employment, 1976	70,000
Projected employment, 1985	178,000
Percent growth, 1976-85	154.3
Average annual openings, 1976-85	37,000
Growth	12,000
Replacement	25,000

Available training data ....

Social service aides. Social service aides are trained on the job. These workers have a wide range of educational backgrounds, from elementary school to college. An aide's level of responsibility usually is related to formal educational attainment, so that people who have more schooling do different kinds of work than those who have less. For example, persons who have a grade school education may enter the field in clerical positions, while those who have a college degree may assume some duties normally performed by social workers.

In hiring, employers consider an applicant's desire to help people and his or her ability to communicate with community agencies and clients. An individual's potential for advancement and need for work also may be considered. Most employers emphasize the development of career ladders for these workers based upon on-the-job training, work experience, and further education.

Employment, 1976	100,000
Projected employment, 1985	130,000
Percent growth, 1976-85	30.3
Average annual openings, 1976-85	7,600
Growth	4,300
Replacement	3,300

Available training data:

Junior college graduates	3,009

Social workers. A bachelor's degree in social work generally is the minimum educational requirement for beginning jobs in the field. However, many positions, particularly supervisory, research, or administrative jobs, require a master's degree in social work. A doctorate often is preferred for teaching positions.

In mid-1976, 20 States had licensing or registration laws concerning social work practice and the use of professional social work titles. Usually, work experience, successful completion of an examination, or both are required. One of these titles is ACSW (Academy of Certified Social Workers) which can be used by members of the National Association of Social Workers who have at least 2 years of post-master's degree work experience and have passed the ACSW examination.

Employment, 1976	330,000
Projected employment, 1985	440,000
Percent growth, 1976-85	32.7
Average annual openings, 1976-85	25,000
Growth	12,000
Replacement	13,000

Available training data:

Degrees in social work and helping services:

Bachelor's degrees	10,852
Master's degrees	8,943
Doctor's degrees	163

Art, Design, and Communications–Related Occupations

Performing artists

Actors and actresses. Formal training in acting is increasingly necessary for entrance in the field. Training can be obtained at dramatic arts schools, located chiefly in New York, and in hundreds of colleges and universities throughout the country. Experience is important; participating in school or community productions is excellent preparation.

Employment, 1976	13,000
Projected employment, 1985	15,000
Percent growth, 1976-85	15.4
Average annual openings, 1976-85	600
Growth	200
Replacement	400

Available training data:

Degrees in drama:

Bachelor's degrees	5,691
Master's degrees	1,394
Doctor's degrees	112

Dancers. Serious training at a dance school or through private lessons should begin by age 12 or earlier, especially for ballet dancers. Training and practice continue throughout a dancer's career. Many colleges and universities offer dance instruction, but a college education is not required for employment as a professional dancer.

Employment, 1976	8,000
Projected employment, 1985	9,900
Percent growth, 1976-85	23.8
Average annual openings, 1976-85	500
Growth	200
Replacement	300

Available training data:

Degrees in dance:

Bachelor's degrees	772
Master's degrees	180
Doctor's degrees	1

Musicians. Studying an instrument, either through school or private lessons, should begin at an early age. More advanced training can be acquired through further study under an accomplished musician, in a college or university which has a strong music program, or in a music conservatory.

Employment, 1976	127,000
Projected employment, 1985	153,000
Percent growth, 1976-85	20.5
Average annual openings, 1976-85	7,200
Growth	2,900
Replacement	4,300

Available training data:

Degrees in music:[1]

Bachelor's degrees	5,077
Master's degrees	2,315
Doctor's degrees	249

[1] Includes degrees in music performance, composition, and theory.

Singers. As a rule, intensive voice training should not begin until after the individual has matured physically. Voice training can be obtained through private lessons, or in a music conservatory or department of music in a college or university. A background in music theory and history is helpful for persons interested in singing professionally, although formal voice training is not essential for a successful career in popular music.

Employment, 1976	23,000
Projected employment, 1985	27,000
Percent growth, 1976-85	17.4
Average annual openings, 1976-85	1,200
Growth	400
Replacement	800

Available training data ....

Design occupations

Architects. All States require architects to be licensed (registered). To obtain a license, applicants must have a bachelor's degree in architecture, have 3 years of experience in an architect's office, and pass a 2-day written examination. Those who have master's degrees need only 2 years of experience. In most States 12 years of practical experience as an architect may be substituted for the bachelor's degree.

Competition for jobs is expected to be keen through the mid-1980's. The National Center for Education Statistics projects that about 6,800 bachelor's degrees in architecture will be awarded annually between 1976 and 1986. An additional 1,750 master's degrees are expected to be conferred. Not all of these graduates are expected to become registered. Based on a followup study of architectural graduates, it is anticipated that 5,200 graduates will actively seek registration and an architectural position each year. This number still exceeds estimated annual openings, however.

Employment, 1976	49,000
Projected employment, 1985	61,600
Percent change, 1976-85	25.0
Average annual openings, 1976-85	3,100
Growth	1,400
Replacement	1,700

Available training data:

Degrees in architecture:

	1975-76	Projected 1976-85 (annual average)
Bachelor's degrees	5,607	6,814
Master's degrees	1,318	1,752
Doctor's degrees	18	20

Commercial artists. Artistic ability and good taste are the most important qualifications for success in commercial art. However, these qualities must be developed through specialized training in the techniques of commercial and applied art. Individuals can prepare for a career in commercial art at a 2- or 4- year trade school, or a junior college, college, or university. Although many employers prefer to hire graduates of a college or university program, the quality and reputation of a particular program is more important than the type of institution at which it is offered. Limited training in commercial art also may be obtained through vocational high schools and on-the-job experience, but supplemental training usually is needed for advancement.

Employment, 1976	67,000
Projected employment, 1985	80,000
Percent growth, 1976-85	19.4
Average annual openings, 1976-85	3,600
Growth	1,500
Replacement	2,100

Available training data:

Public vocational education completions	8,049
Private vocational education completions	3,000
Job Corps completions	8

Display workers. Most display workers learn their trade on the job in 1 to 2 years. A high school diploma is usually required, and some employers prefer applicants who have studied interior decorating, fashion design, or art. Many high schools and vocational schools offer these courses.

Employment, 1976	36,000
Projected employment, 1985	40,000
Percent growth, 1976-85	11.1
Average annual openings, 1976-85	1,900
Growth	500
Replacement	1,400

Available training data

Floral designers. Although there are no minimum educational requirements, most employers prefer high school graduates. Training usually takes place on the job. However, an increasing number of these workers receive training by attending adult education programs, junior colleges, or commercial floral design schools. Manual dexterity and a good sense of color, balance, and proportion are primary qualifications. High school courses in business arithmetic, bookkeeping, selling techniques, and other business subjects are helpful.

Employment, 1976	37,000
Projected 1985 employment	52,000
Percent growth, 1976-85	40.5
Average annual openings, 1976-85	3,300
Growth	1,600
Replacement	1,700
Available training data	-

Industrial designers. The usual way to enter this field is to complete an industrial design curriculum in an art school, an art department of a university, or a technical college. Persons who have degrees in other fields, such as engineering, architecture, or fine arts, may qualify as industrial designers if their backgrounds match the type of work being done by their employers. Artistic talent is important.

Employment, 1976	12,000
Projected employment, 1985	13,300
Percent growth, 1976-85	10.8
Average annual openings, 1976-85	500
Growth	200
Replacement	300
Available training data	-

Interior designers. Formal training in interior design is becoming increasingly necessary for entrance into the field. Training is available through a 2- or 3-year course at an art school or institute specializing in interior decorating and design, or through a 4-year college or university program leading to a degree in interior design and decoration. In most cases, 1 to 5 years of on-the-job training also are necessary before a trainee becomes eligible for advancement to designer.

Employment, 1976	37,000
Projected employment, 1985	45,000
Percent growth, 1976-85	21.6
Average annual openings, 1976-85	1,900
Growth	900
Replacement	1,000

Available training data:

Degrees in interior design:

Bachelor's degrees	786
Master's degrees	13
Doctor's degrees	1

Landscape architects. A bachelor's degree in landscape architecture through a 4- to 5-year program of study is the usual requirement for employment. To qualify for a license for independent practice, which is required in more than half of all States, applicants must have a degree in landscape architecture from an accredited school, 2 to 4 years' experience, and must pass an examination. Experience sometimes may be substituted for the degree.

Employment, 1976	13,000
Projected employment, 1985	17,000
Percent growth, 1976-85	30.8
Average annual openings, 1976-85	900
Growth	400
Replacement	500

Available training data:

Degrees in landscape architecture:

Bachelor's degrees	948
Master's degrees	217

Photographers. There are several ways to prepare for work as a professional photographer. People interested in commercial photography often start as trainees in a commercial studio, and learn the necessary skills through 2 or 3 years of on-the-job training. For work in industrial or scientific photography, post high school education and training are needed. Requirements for news photographers vary with the size of the newspaper or magazine. Photographic training is available in colleges, universities, community and junior colleges, and art schools. Programs leading to associate, bachelor's and master's degrees in photography are offered, and some schools have certificate programs.

Employment, 1976	85,000
Projected employment, 1985	97,000
Percent growth, 1976-85	14.0
Average annual openings, 1976-85	3,700
Growth	1,300
Replacement	2,400

Available training data:

Junior college graduates	810

Degrees in photography:

Bachelor's degrees	846
Master's degrees	115

Communications-related occupations

Newspaper reporters. Most large newspapers will hire only applicants who have a bachelor's degree; either a journalism major or another major combined with journalism classes is preferred. Graduate work is becoming increasingly important. Some jobs are available for talented writers without college training on rural, small-town, and suburban papers, but even these jobs are largely filled by college graduates who are seeking experience.

Employment, 1976	40,500
Projected employment, 1985	46,000
Percent growth, 1976-85	13.9
Average annual openings, 1976-85	2,100
Growth	600
Replacement	1,500

Available training data:

Degrees in journalism:

	1975-76	*Projected 1976-85 (annual average)*
Bachelor's degrees..	7,711	10,872
Master's degrees.....	956	1,322
Doctor's degrees....	15	28

Radio and television announcers. A college liberal arts education provides an excellent background for an announcer, and many universities offer courses of study in the broadcasting field. A number of private vocational schools also offer training. It often is helpful to have a Federal Communications Commission radio telephone operator license, since the added skill enables announcers to handle a variety of broadcasting duties. Such versatility often is important in small stations, and may give applicants an extra edge in the very competitive broadcasting job market.

Experience often is necessary. People who are seeking their first jobs may have difficulty finding the position they want, and may have to take a job at a small, rural station to gain the experience required by larger stations. Work at a college station may be helpful.

Employment, 1976	26,000
Projected employment, 1985	34,500
Percent growth, 1976-85	32.2
Average annual openings, 1976-85	1,300
Growth	900
Replacement	400
Available training data	-

Appendix A. Assumptions and Methods Used to Prepare the Employment Projections

The projections in this bulletin were developed as part of the Bureau's program for conducting research in, and producing information on, future occupational and industrial requirements and resources. The Bureau revises its projections every 2 years; during the next revision, projections will be prepared for 1990.

The Bureau's projections to 1985 presented here were developed from data on population, industry and occupational employment, productivity, consumer expenditures, and other factors expected to affect employment. The Bureau's research efforts provided much of these data, but many other agencies of the Federal Government were important contributors. In addition, experts in industry, unions, professional societies, and trade associations furnished data and supplied information through interviews.

Information compiled from these sources was analyzed in conjunction with the Bureau's model of the economy in 1985. Like other models used in economic forecasting, it encompasses the major facets of the economy and represents a comprehensive view of its projected structure. The Bureau's model is comprised of internally consistent projections of gross national product (GNP) and its components–consumer expenditures, business investment, government expenditures, and net exports; industrial output and productivity; labor force; average weekly hours of work; and employment for detailed industry groups and occupations. The methods used to develop the employment projections used in this bulletin are the same as those used in other Bureau of Labor Statistics studies of the economy. Detailed descriptions of these methods appear in *The U.S. Economy in 1985: A Summary of BLS Projections,* Bulletin 1809, and the *BLS Handbook of Methods for Surveys and Studies,* Bulletin 1910.

Assumptions

The Bureau's projections to 1985 are based on the following general assumptions:

The institutional framework of the U.S. economy will not change radically;

Current social, technological, and scientific trends will continue, including values placed on work, education, income, and leisure;

The economy will gradually recover from the higher unemployment levels of the mid-1970's and reach full employment (defined as an unemployment rate of 4 percent) in the mid-1980's;

No major event such as widespread or long-lasting energy shortages or war will significantly alter the industrial structure of the economy or alter the rate of economic growth;

Trends in the occupational structure of industries will not be altered radically by changes in relative wages, technological changes, or other factors.

Methods

Beginning with population projections by age and sex developed by the Bureau of the Census, a projection of the total labor force is derived using expected labor force participation rates for each of these groups. In developing the participation rates, the BLS takes into account a variety of factors that affect a person's decision to enter the labor force, such as school attendance, retirement practices, and family responsibilities.

The labor force projection then is translated into the level of GNP that would be produced by a fully employed labor force. Unemployed persons are subtracted from the labor force estimate and the result is multiplied by a projection of output per worker. Estimates of future output per worker are based on an analysis of trends in productivity (output per work hour) among industries and changes in the average weekly hours of work.

Next, the projection of GNP is divided among its major components: Consumer expenditures, business investment, government expenditures–Federal, State, and local–and net exports. Each of these components is broken down by producing industry. Thus, consumer expenditures, for example, are divided among industries producing goods and services such as housing, food, automobiles, medical care, and education.

Estimates developed for these products and services are translated into detailed projections of industry output not only for industries producing the final product, but also for intermediate and basic industries that provide raw materials, electric power, transportation, component parts, and other inputs to production. The Department of Commerce has developed input-output tables that indicate the amount of output from each industry–steel, glass, plastics, etc. –required to produce a final product, automobiles for example.

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From estimates of future output per work hour based on studies of productivity and technological trends for each industry, industry employment projections are derived from the output estimates.

These projections are then compared with employment projections derived using regression analysis. Regression analysis develops equations that relate employment by industry to combinations of economic variables, such as population and income, that are considered determinants of long-run changes in employment. By comparing projections from input-output analysis and regression analysis, areas may be identified where one method produces a projection inconsistent with past trends or with the Bureau's economic model. The projections are then adjusted accordingly.

Projections of industry employment are translated into occupational employment projections using an industry-occupation matrix. This matrix, which is divided into 201 industry sectors and 421 occupation sectors, describes the current and projected occupational structure of each industry. By applying projected industry occupational structures to projected industry employment and aggregating the results, employment projections for each of the 421 matrix occupations are obtained. The growth rate of an occupation, thus, is determined by 1) changes in the proportion of workers in the occupation to the total work force in each industry, and 2) the growth rate of industries in which an occupation is concentrated. An occupation projected to increase as a proportion of the work force in each industry, for example, or one concentrated in industries projected to grow more rapidly than the average for all industries, would be projected to grow faster than the average for all occupations.

In some cases employment is related directly to one of the components of the BLS model—for example, the number of cosmetologists is related to consumer expenditures for beauty shop services. In others, employment is related to an independent variable not explicitly projected in the model, but believed to be a primary determinant of employment in that occupation. The projection of automobile mechanics, for example, is based on the expected stock of motor vehicles. Independent projections are revised, if necessary, to assure consistency with those in the matrix.

In addition to occupational employment projections, the number of workers needed as replacements is projected. Separations constitute a significant source of openings; in most occupations, more workers are needed to replace those who retire, die, or leave the occupation than are needed to fill jobs created by growth.

To estimate replacement openings, the BLS has developed tables of working life based on actuarial experience for deaths and on decennial census data for general patterns of labor force participation by age and sex. Withdrawals from each occupation are calculated separately for men and women by age group to compute an overall separation rate for the occupation. These rates are used to estimate average annual replacement needs for each occupation over the projection period.[1]

Supply estimates used in analysis of certain occupations represent the numbers of workers who are likely to seek entry to a particular occupation if past trends of entry to the occupation continue. These estimates are developed independently of the demand estimates. Thus, supply and demand are not discussed in the usual sense, in which wages play a major role in equating supply and demand.

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[1] For detailed information see *Tomorrow's Manpower Needs, Supplement 4, Estimating Occupational Separations from the Labor Force for States* (Bureau of Labor Statistics, 1974).

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Appendix B. Detailed Occupational Projections

This appendix presents 1976 employment, projected 1985 employment, and projected average annual job openings in tabular form for 241 occupations. These data were developed as part of the research underlying the 1978-79 edition of the *Occupational Outlook Handbook.* The 13 occupational clusters from the *Handbook* have been used: Industrial production and related occupations; office occupations; service occupations; education and related occupations; sales occupations; construction occupations; occupations in transportation activities; scientific and technical occupations; mechanics and repairers; health occupations; social scientists; social service occupations; and art, design, and communications-related occupations.

Applicable program codes for related instructional programs are included, both for vocational and higher education (Vocational Education Codes and Higher Education General Information Survey (HEGIS) Codes). Totals and percentages in table B-1 were calculated from unrounded figures and may not correspond exactly to the rounded data shown.

Table B-1. Employment, 1976 and 1985 (projected), and average annual openings, by occupation, 1976-85

Occupation	Vocational educational code[1]	HEGIS code[2]	Estimated employment, 1976	Projected employment, 1985	Percent change, 1976-85[3]	Annual average openings, 1976-85		
						Total	Employment change	Replacement needs[4]
Industrial production and related occupations:								
Foundry occupations:								
Patternmakers	17.2302 17.3699	....	18,000	20,500	14.9	900	300	600 ......
Molders	17.2301	....	53,000	60,000	14.5	1,900	800	1,100
Coremakers	17.2301	....	22,000	24,500	14.5	1,000	300	700
Machining occupations:								
All-round machinists	17.2302	....	405,000	475,000	17.1	20,000	8,000	12,000
Instrument makers (mechanical)	17.2302	....	6,000	6,900	17.1	300	100	200
Machine tool operators	17.2302	....	508,000	595,000	16.9	22,000	9,500	12,500
Setup workers (machine tools)	17.2302	....	60,000	75,000	25.0	3,500	1,700	1,000
Tool-and-die makers	17.2307	....	183,000	215,000	17.5	9,000	3,600	5.400
Printing occupations:	17.1900	5009	....	....	......	......	....	....
Bookbinders and bindery workers	17.1906	....	80,000	85,000	6.0	3,400	3.400	2,900
Compositors	17.1901	....	152,000	140,000	–7.9	3,600	– 3,600	4,900
Electrotypers and stereotypers	17.1903	....	4,000	3,200	–20.4	60	60	150
Lithographers	17.1902	....	29,000	39,000	34.5	1,900	1,900	800
Photoengravers	17.1904	....	10,000	9,000	–10.0	100	100	200
Printing press operators and assistants	17.1902	....	145,000	160,000	11.0	5,100	1,800	3,300
Other industrial production and related occupations:								
Assemblers	....	....	1,100,000	1,450,000	33.3	70.000	40,000	30.000
Automobile painters	17.0301	....	32,000	37,000	15.6	1,300	600	700
Blacksmiths	17.2399	....	10,000	6,000	–33.3	100	–400	500
Blue-collar worker supervisors	17.1700	....	1,445,000	1,775,000	22.9	79,000	37.000	42,000
Boilermaking occupations	17.1099	....	34,000	56,000	64.7	3,800	2,400	1,400
Boiler tenders	17.3200	....	73,000	72,000	– 1.4	1,500	–100	1,600
Electroplaters	17.2399	....	36,000	41,000	12.9	1,300	500	800
Forge shop occupations	17.2399	....	71,000	80,000	13.3	2,700	1,000	1,700
Furniture upholsterers	17.3500	....	27,000	27,700	2.6	1,100	100	1,000

See footnotes at end of table.

Table B-1. Employment, 1976 and 1985 (projected), and average annual openings, by occupation, 1976-85—Continued

Occupation	Vocational educational code[1]	HEGIS code[2]	Estimated employment, 1976	Projected employment, 1985	Percent change, 1976-85[3]	Annual average openings, 1976-85		
						Total	Employment change	Replacement needs[4]
Inspectors (manufacturing)	17.2400	....	692,000	950,000	37.5	52,000	29,000	23,900
Millwrights	17.1099	....	96,000	105,000	9.4	3,600	1,000	43,000
Motion picture projectionists	......	....	16,500	17,000	3.0	1,200	0	1,800
Ophthalmic laboratory	07.0601	....	....	....	....	....	......	....
technicians	17.2101	5212	22,000	29,000	29.3	1,500	700	5,700
Photographic laboratory								600
occupations	17.0900	5007	35,000	47,000	34.0	2,400	1,300	1,900
Power truck operators	17.100302	....	360,000	433,000	21.7	14,600	8,600	–2,900
Production painters	......	....	104,000	143,000	37.5	6,900	4,300	15,500
Stationary engineers	17.3200	....	194,000	194,000	0.0	7,400	0	145,000
Wastewater treatment								10,500
plant operators								8,000
(sewage plant operators)	17.3203	....	100,000	150,000	51.6	10,400	5,600	10,500
Welders	17.2306	5308	660,000	835,000	28.3	33,800	19,300	24,000
Office occupations:	14.0000							
Clerical occupations:								
Bookkeeping workers	14.0102	....	1,700,000	1,900,000	12.8	95,000	23,900	71,100
Cashiers	14.0103	....	1,250,000	1,640,000	30.5	92,000	43,000	49,000
Collection workers	04.0800	....	64,000	80.000	25.5	4,400	1,800	2,600
	14.9900	....	....	....	....	....	......	......
File clerks	14.0302	....	270,000	320,000	19.0	16,500	5,700	10,800
Hotel front office clerks	04.1100	....	62,000	68,000	9.3	3,300	600	2,700
Office machine operators	14.0104	5005	163,000	180,000	10.4	7,700	1,900	5,800
Postal clerks	14.0403	....	270,000	240,000	–9.8	3,700	–2,900	6,600
Receptionists	14.0406	....	500,000	640,000	27.5	38,000	15,500	22,500
Secretaries and stenographers	14.0700	5005	3,500,000	4,800,000	37.1	295,000	145,000	150,000
Shipping and receiving clerks	14.0503	....	440,000	535,000	21.2	23,000	10,500	12,500
Statistical clerks	14.0303	....	337,000	410,000	21.4	21,000	8,000	13,000
Stock clerks	14.0504	....	490,000	585,000	18.7	25,000	10,500	14,500
Typists	14.0900	5005	1,000,000	1,200,000	21.8	63,000	24,000	39,000
Computer and related occupations:	14.0200							
Computer operating personnel	14.0201	5102	565,000	540,000	–4.0	8,500	–2,300	10,800
	14.0202	5104	......	....	....	....	....	....
	14.020201	....	....	....	....	....	....	....
Programmers	14.0203	0704	230,000	290,000	27.4	9,700	7,000	2,700
		5103	....	....	....	....	....	......
Systems analysts	14.0204	0705	160,000	210,000	32.9	7,600	5,800	1,800
Banking occupations:								
Bank clerks	14.0102	....	456,000	615,000	34.5	36,000	17,500	18,500
	14.0104	....	....	....	....	....	....	......
	14.0303	....	....	....	....	....	....	......
	14.0399	....	....	....	....	....	....	......
Bank officers and managers	04.0400	0504	319,000	465,000	45.8	28,000	16,000	12,000
		5003	....	....	....	....	....	....
Bank tellers	14.0105	....	310,000	405,000	30.0	21,000	10,500	10,500
Insurance occupations:	04.1300	0512	....	....	....	....	....	....
Actuaries	.....	1703	9,000	11,400	26.7	500	250	250
Claim representatives	04.1300	....	155,000	190,000	21.8	7,700	3,800	3,900
Insurance agents, brokers, and underwriters	04.1300	....	490,000	580,000	18.6	27,500	10,100	17,400
Administrative and related occupations:	......	0502	865,000	1,050,000	21.3	51,500	20,500	31,000
Accountants	......	5002	....	....	....	......	.....	......

See footnotes at end of table.

Table B-1. Employment, 1976 and 1985 (projected), and average annual openings, by occupation, 1976-85—Continued

Occupation	Vocational educational code[1]	HEGIS code[2]	Estimated employment, 1976	Projected employment, 1985	Percent change, 1976-85[3]	Annual average openings, 1976-85		
						Total	Employment change	Replacement needs[4]
Advertising workers	04.0100	0600	180,000	(5)	(5)	(5)	(5)	(5)
Buyers	04.0800	0509	109,000	120,000	10.1	5,700	1,200	4,500
	......	5004	....	....	....	......	.....	......
City managers	......	2102	3,000	3,900	28.3	250	100	150
College student personnel workers	......	0826	57,000	(5)	(5)	(5)	(5)	(5)
Credit managers	14.0899	0504	53,000	60,000	13.2	2,500	800	1,700
	......	5003	....	....	....	......	.....	......
Hotel managers and assistants	04.1100	0508	137,000	150,000	9.6	7,000	1,500	5,500
Industrial traffic managers	04.1900	....	21,000	(5)	(5)	(5)	(5)	(5)
Lawyers	......	1401	396,000	490,000	25.0	23,400	10,400	13,000
Marketing research workers	04.0100	0509	25,000	(5)	(5)	(5)	(5)	(5)
Personnel and labor relations workers	14.0602	....	335,000	450,000	34.9	23,000	13,000	10,000
	14.0603	0515	....	....	....	......	.....	......
	14.0699	0516	....	....	....	......	.....	......
Public relations workers	04.0100	....	115,000	150,000	30.5	8,300	3,900	4,400
Purchasing agents	04.0800	0509	192,000	260,000	34.9	13,800	7,400	6,400
	......	5004	....	....	....	......	.....	......
Urban planners	......	0206	16,000	23,000	46.5	1,100	800	300
Service occupations:								
Cleaning and related occupations:								
Building custodians	17.1100	....	2,100,000	2,423,000	15.3	160,000	35,000	125,000
Hotel housekeepers and assistants	09.0205	....	17,000	19,000	11.9	1,100	200	900
Pest controllers	......	....	27,000	(5)	(5)	(5)	(5)	(5)
Food service occupations:	17.2900							
Bartenders	......	....	261,000	310,000	18.8	17,800	5,400	12,400
Cooks and chefs	17.2902	....	1,065,000	1,350,000	26.6	79,000	31,500	47,500
Dining room attendants and dishwashers	......	....	442,000	545,000	23.3	22,400	11,400	11,000
Food counter workers	17.2904	....	421,000	570,000	35.2	33,000	16,500	16,500
Meatcutters	17.2903	....	215,000	200,000	−7.9	4,900	−1,900	6,800
Waiters and waitresses	17.2904	....	1,260,000	1,500,000	19.5	71,000	27,000	44,000
Personal service occupations:								
Barbers	17.2601	5006	124,000	126,000	1.4	8,100	200	7,900
Bellhops and bell captains	04.1100	....	16,600	16,500	−0.9	600	0	600
Cosmetologists	17.2602	5006	534,000	625,000	16.7	30,000	10,000	20,000
Funeral directors and embalmers	07.0909	....	45,000	45,000	0.0	2,200	0	2,200
Private household service occupations:								
Private household workers	09.0201	....	1,125,000	915,000	−18.8	53,000	−23,000	76,000
	09.0202	....	....	....	....	.....	......	....
	09.0203	....	....	....	....	.....	......	....
	09.0205	....	....	....	....	.....	......	....
Protective and related service occupations:								
Correction officers	......	....	90,000	105,000	16.9	8,900	1,700	7,200
FBI special agents	......	....	8,600	(5)	(5)	(5)	(5)	(5)
Firefighters	17.2801	5507	210,000	260,000	21.1	8,300	5,000	3,300
Guards	17.2802	....	500,000	680,000	36.3	63,000	20,000	43,000
Police officers	17.2802	2105	500,000	700,000	40.4	32,500	22,800	9,700

See footnotes at end of table.

Table B-1. Employment, 1976 and 1985 (projected), and average annual openings, by occupation, 1976-85—Continued

Occupation	Vocational educational code[1]	HEGIS code[2]	Estimated employment, 1976	Projected employment, 1985	Percent change, 1976-85[3]	Annual average openings, 1976-85		
						Total	Employment change	Replacement needs[4]
State police officers	17.2802	2105	48,000	57,000	20.6	1,900	1,100	800
	......	2209	....	....	....	.....	......	.....
		5505	....	....	....	.....	......	.....
Construction inspectors (government)	17.2899	....	22,000	30,000	36.4	2,300	900	1,400
Health and regulatory inspectors (government)	17.2899	5408	115,000	145,000	27.4	7,900	3,500	4,400
Occupational safety and health workers	16.0602	....	28,000	(5)	(5)	(5)	(5)	(5)
	17.2801	....	....	....	....	......	......	.....
	17.2899	....	....	....	...	......	......	.....
Other service occupations:								
Mail carriers	14.0403	....	250,000	250,000	–0.4	5,300	0	5,300
Telephone operators	14.0401	....	340,000	330,000	–3.8	11,600	–1,100	12,700
Education and related occupations:								
Teaching occupations:								
Kindergarten and elementary school teachers	......	0802	1,364,000	1,498,000	9.8	70,000	15,000	55,000
Secondary school teachers	......	0803	1,111,000	986,000	–11.3	13,000	–14,000	27,000
College and university teachers .	......	0805	593,000	610,000	2.9	17,000	2,000	15,000
Teacher aides	......	....	320,000	495,000	54.4	29,000	19,000	10,000
Library occupations:								
Librarians	......	1601	128,000	145,000	13.3	8,000	2,000	6,000
Library techincians and assistants	14.0499	5504	143,000	168,000	17.5	8,300	2,800	5,500
Sales occupations:	04.0000							
Automobile parts counter workers	04.0300	0509	75,000	97,000	27.5	4,200	2,300	1,900
Automobile sales workers	04.0300	0507	130,000	160,000	23.1	9,000	3,900	5,100
	......	5004	....	....	....	.....	.....	.....
Automobile service advisors	04.0300	0509	24,000	27,000	15.6	1,000	400	600
	......	5004	....	....	....	.....	.....	.....
Gasoline service station attendants	04.1600	....	420,000	470,000	12.6	14,800	5,800	9,000
Manufacturers' sales workers	04.1200	0509	362,000	417,000	15.1	17,600	6,000	11,600
	......	5004	....	....	....	.....	.....	.....
Models	......	....	8,300	(5)	(5)	(5)	(5)	(5)
Real estate agents and brokers ..	04.1700	0511	450,000	575,000	27.5	45,500	13,800	31,700
	......	5004	....	....	....	.....	.....	.....
Retail trade sales workers	04.0800	0509	2,725,000	3,000,000	10.2	155,000	31,000	124,000
	....	5004	....	....	....	.....	.....	.....
Route drivers	....	....	200,000	194,000	–3.6	3,400	–800	4,200
Securities sales workers	04.0400	0505	90,000	105,000	15.4	5,500	1,600	3,900
Travel agents	....	....	15,000	22,000	46.7	1,400	800	600
Wholesale trade sales workers ...	04.0800	0509	808,000	945,000	16.9	41,000	15,000	26,000
Construction occupations:								
Bricklayers, stonemasons, and marblesetters	17.1004	....	175,000	205,000	17.1	7,500	3,300	4,200
Carpenters	17.1001	....	1,010,000	1,260,000	24.8	67,000	28,000	39,000
Cement masons and terrazzo workers	17.1099	....	71,000	120,000	69.0	7,500	5,400	2,100
Construction laborers	17.1099	....	715,000	900,000	25.9	40,000	20,500	19,500
Drywall installers and finishers ...	17.1008	....	45,000	(5)	(5)	(5)	(5)	(5)
Electricians (construction)	17.1002	....	260,000	320,000	25.5	13,700	6,700	7,000
Elevator constructors	17.1099	....	20,000	(5)	(5)	(5)	(5)	(5)
Floor covering installers	17.1099	....	85,000	100,000	20.5	3,200	1,900	1,300
Glaziers	17.1099	....	10,000	13,000	23.3	600	350	250

See footnotes at end of table.

Table B-1. Employment, 1976 and 1985 (projected), and average annual openings, by occupation, 1976-85—Continued

Occupation	Vocational educational code[1]	HEGIS code[2]	Estimated employment, 1976	Projected employment, 1985	Percent change, 1976-85[3]	Annual average openings, 1976-85		
						Total	Employment change	Replacement needs[4]
Insulation workers	17.1099	....	30,000	50,000	66.7	2,900	2,200	700
Ironworkers	17.1099	....	71,000	112,000	60.0	6,500	4,700	1,800
Lathers	17.1006	....	20,000	(5)	(5)	(5)	(5)	(5)
Operating engineers (construction machinery operators)	17.100302	....	585,000	810,000	38.5	41,000	25,000	16,000
Painters and paperhangers	17.1005	....	....	....	....	......	.....	......
Painters	......	....	410,000	500,000	21.4	27,000	10,000	17,000
Paperhangers	......	....	15,000	25,000	92.3	2,400	1,300	1,100
Plasterers	17.1006	....	24,000	25,000	4.7	900	100	800
Plumbers and pipefitters	17.1007	....	385,000	535,000	39.0	30,000	17,000	13,000
Roofers	17.1010	....	90,000	130,000	44.0	6,300	4,400	1,900
Sheet-metal workers	17.2305	....	65,000	75,000	15.4	2,600	1,100	1,500
Tilesetters	17.1004	....	36,000	45,000	25.0	1,800	1,000	800
Occupations in transportation activities:								
Air transportation occupations:	17.0400							
Air traffic controllers	17.0403	....	21,000	28,400	35.8	1,100	800	300
Airplane mechanics	17.0401	....	110,000	138,000	25.5	5,200	3,100	2,100
Airplane pilots	16.0601	....	83,000	110,000	33.6	4,100	3,100	1,000
Flight attendants	04.1900	5006	42,000	76,000	79.2	6,000	3,700	2,300
Reservation, ticket, and passenger agents	04.1900	....	51,000	65,000	26.9	2,900	1,500	1,400
Merchant marine occupations:								
Merchant marine officers	17.0802	....	13,300	15,200	14.6	600	200	400
Merchant marine sailors	17.0801	....	33,200	30,600	−7.8	400	−300	700
Railroad occupations:								
Brake operators	....	....	65,000	68,000	4.8	1,700	300	1,400
Conductors	....	....	35,900	42,000	16.7	2,200	700	1,500
Locomotive engineers	....	....	33,300	39,500	18.6	2,400	700	1,700
Shop trades	....	....	72,600	60,000	−17.5	800	−1,400	2,200
Signal department workers	17.1402	....	11,500	11,400	−0.9	400	0	400
Station agents	04.1900	....	7,000	3,000	−57.1	−300	−400	100
	14.0103	....	....	....	....	......	.....	.....
Telegraphers, telephoners, and tower operators	14.0401	....	10,200	6,500	−36.3	−200	−400	200
Track workers	......	....	56,200	52,000	−7.1	800	−500	1,300
Driving occupations:								
Intercity busdrivers	04.1900	....	25,000	30,000	17.9	1,400	500	900
Local transit busdrivers	04.1900	....	81,000	99,000	22.5	5,100	2,000	3,100
Local truck drivers	......	....	1,600,000	1,940,000	21.7	73,000	38,000	35,000
Long-distance truck drivers	......	....	467,000	520,000	10.9	15,400	5,700	9,700
Parking attendants	04.0300	....	38,000	40,000	5.3	2,500	200	2,300
Taxicab drivers	04.1900	....	94,000	94,000	0.4	4,200	0	4,200
Scientific and technical occupations:								
Conservation occupations:								
Foresters	01.0700	0114	25,000	29,000	15.7	1,100	400	700
Forestry technicians	01.0601	5403	11,000	14,000	27.2	600	300	300
Range managers	01.0608	0117	3,000	4,100	37.5	200	100	100
Soil conservationists	......	....	7,500	9,000	20.0	400	200	200
Engineers[6]	......	0900	1,133,000	1,415,000	25.0	56,500	31,500	25,000
Aerospace	......	0902	50,000	58,500	14.7	1,500	800	700
Agricultural	......	0903	12,000	15,000	25.0	600	300	300
Biomedical	......	0905	3,000	3,800	26.7	150	100	50
Ceramic	......	0916	12,000	15,000	25.0	600	300	300
Chemical	......	0906	53,000	64,000	20.6	2,100	1,200	900
Civil	......	0908	155,000	192,000	23.9	8,900	4,100	4,800

See footnotes at end of table.

Table B-1. Employment, 1976 and 1985 (projected), and average annual openings, by occupation, 1976-85—Continued

Occupation	Vocational educational code[1]	HEGIS code[2]	Estimated employment, 1976	Projected employment, 1985	Percent change, 1976-85[3]	Annual average openings, 1976-85		
						Total	Employment change	Replacement needs[4]
Electrical	......	0909	300,000	370,000	23.3	12,800	7,800	5,000
Industrial	......	0913	200,000	255,000	27.9	10,500	6,200	4,300
Mechanical	......	0910	200,000	245,000	21.5	9,300	4,800	4,500
Metallurgical	......	0914	17,000	22,000	29.4	900	500	400
Mining	......	0918	6,000	8,800	46.7	600	300	300
Petroleum	......	0907	20,000	28,000	40.0	1,300	900	400
Environmental scientists:								
Geologists	......	1914	34,000	47,500	38.1	2,300	1,500	800
Geophysicists	......	1916	12,000	16,700	38.0	800	500	300
Meteorologists	......	1913	5,500	6,300	14.0	200	100	100
Oceanographers	......	1919	2,700	3,400	25.3	150	100	50
Life science occupations:								
Biochemists	......	0414	12,700	15,700	23.6	600	300	300
Life scientists	......	0400	205,000	265,000	28.6	12,000	6,500	5,500
Soil scientists	......	....	2,500	2,800	12.0	80	30	50
Mathematics occupations:								
Mathematicians	......	1701	38,000	41,000	8.8	1,000	300	700
Statisticians	......	1702	24,000	30,000	26.7	1,500	700	800
Physical scientists:								
Astronomers	......	1911	2,000	2,100	5.0	40	10	30
Chemists	......	1905	148,000	175,000	19.0	6,400	3,200	3,200
Food scientists	......	0113	7,000	8,400	20.0	300	150	150
Physicists	......	1902	48,000	53,000	8.7	1,100	500	600
Other scientific and technical occupations:								
Broadcast technicians	16.0108	5008	22,500	(5)	(5)	(5)	(5)	(5)
Drafters	17.1300	5304	320,000	420,000	30.6	16,500	10,900	5,600
Engineering and science technicians	16.0100	5300	586,000	760,000	29.9	29,000	19,500	9,500
	....	5401	....	....	....	......	.....	......
	....	5407	....	....	....	....	.....	......
Surveyors	....	5409	52,000	74,000	41.5	3,500	2,400	1,100
Mechanics and repairers:								
Telephone craft occupations:								
Central office craft occupations	17.1501	....	135,000	165,000	23.3	5,000	3,500	1,500
Central office equipment installers	17.1501	....	20,000	16,000	–20.0	–300	–500	200
Line installers and cable splicers	17.1402	....	54,000	56,000	2.8	600	200	400
Telephone and PBX installers and repairers	17.1501	....	110,000	135,000	24.2	4,100	2,900	1,200
Other mechanics and repairers:								
Air-conditioning, refrigeration and heating mechanics	17.0100	5317	175,000	285,000	62.9	17,400	12,200	5,200
Appliance repairers	17.0200	5310	144,000	172,000	19.6	7,000	3,200	3,800
Automobile body repairers	17.0301	....	174,000	200,000	15.3	6,000	2,900	3,100
Automobile mechanics	17.0302	5306	790,000	915,000	15.9	32,000	14,000	18,000
Boat-enginer mechanics	17.2200	....	15,000	17,700	15.0	800	300	500
Bowling-pin-machine mechanics	17.1401	....	5,800	(5)	(5)	(5)	(5)	(5)
Business machine repairers	17.0600	5310	58,000	80,000	37.8	3,400	2,400	1,000
Computer service technicians	16.0108	5105	50,000	93,000	86.0	5,200	4,800	400
Diesel mechanics	17.0108	5307	100,000	125,000	22.9	5,000	2,600	2,400
Electric sign repairers	17.1002	....	10,000	(5)	(5)	(5)	(5)	(5)
Farm equipment mechanics	01.0301	....	66,000	82,000	22.4	4,000	1,700	2,300
Industrial machinery repairers	17.10031	....	320,000	500,000	57.0	30,000	20,000	10,000
Instrument repairers	17.2101	5314	75,000	(5)	(5)	(5)	(5)	(5)
Jewelers	......	....	19,000	21,000	10.5	1,300	200	1,100

See footnotes at end of table.

Table B-1. Employment, 1976 and 1985 (projected), and average annual openings, by occupation, 1976-85—Continued

Occupation	Vocational educational code[1]	HEGIS code[2]	Estimated employment, 1976	Projected employment, 1985	Percent change, 1976-85[3]	Annual average openings, 1976-85		
						Total	Employment change	Replacement needs[4]
Locksmiths	......	....	10,000	(5)	(5)	(5)	(5)	(5)
Maintenance electricians	17.1400	....	300,000	370,000	23.3	15,900	7,800	8,100
Motorcycle mechanics	17.3100	....	12,000	(5)	(5)	(5)	(5)	(5)
Piano and organ tuners and repairers	......	....	8,000	8,400	4.9	650	50	600
Shoe repairers	17.3402	....	25,000	24,000	–4.0	1,800	–100	1,900
Television and radio service technicians	17.1503	5310	114,000	150,000	31.1	6,700	4,000	2,700
Truck and bus mechanics	......	5306	145,000	180,000	20.8	6,900	3,400	3,500
Vending machine mechanics	......	....	25,000	(5)	(5)	(5)	(5)	(5)
Watch repairers	17.2102	....	21,000	23,000	9.5	1,500	200	1,300
Health occupations:								
Dental occupations:								
Dentists	.....	1204	112,000	135,000	20.8	4,800	2,600	2,200
Dental assistants	07.0101	5202	135,000	200,000	51.1	13,500	7,600	5,900
Dental hygienists	07.0102	5203	27,000	60,000	121.9	5,100	3,600	1,500
Dental laboratory technicians	07.0103	5204	42,000	62,000	48.3	3,700	2,200	1,500
Medical practitioners:								
Chiropractors	......	1221	18,000	21,600	20.0	1,600	400	1,200
Optometrists	......	1209	19,700	23,000	16.8	1,500	400	1,100
Physicians and osteopathic physicians	......	1206	375,000	520,000	37.8	21,800	16,000	5,000
	......	1210	......	......	....	......	.....	......
Podiatrists	......	1216	7,500	8,700	15.1	500	100	400
Veterinarians	......	1218	30,500	39,500	27.0	1,800	900	900
Medical technologist, technician, and assistant occupations:								
Electrocardiograph technicians	07.0902	5217	12,000	15,000	28.8	700	400	300
Electroencephalographic technologists and technicians	07.0901	5217	4,300	5,500	31.0	300	150	150
Emergency medical technicians	07.0904	5214	287,000	500,000	74.2	37,000	24,000	13,000
Medical laboratory workers	07.0200	1223	240,000	350,000	45.8	20,000	12,000	8,000
	07.0203	5205	......	......	....	.....	.....	.....
	07.0299	....	......	......	....	.....	....	.....
Medical record technicians and clerks	14.0499	5213	57,000	106,000	86.0	9,000	5,400	3,600
Operating room technicians	07.0305	5211	30,000	41,000	34.4	2,100	1,200	900
Optometric assistants	07.0603	5212	11,800	15,300	29.5	700	400	300
Radiologic (X-ray) technologists	07.0501	5207	80,000	112,000	39.9	6,300	3,600	2,700
Respiratory therapy workers	07.0903	5215	36,000	65,000	80.6	4,700	3,200	1,500
Nursing occupations:								
Registered nurses	07.0301	1203	960,000	1,320,000	37.6	83,000	40,000	43,000
	16.0305	5208	......	....	....	.....	.....	.....
Licensed practical nurses	07.0302	5209	460,000	710,000	54.3	53,000	28,000	25,000
Nursing aides, orderlies, and attendants	07.0303	....	1,000,000	1,350,000	36.2	83,000	40,000	43,000
Therapy and rehabilitation occupations:								
Occupational therapists	....	1208	10,600	18,100	70.8	1,300	900	400
Occupational therapy assistants	07.0401	5210	8,900	16,300	83.1	1,200	800	400
Physical therapists	....	1212	25,000	36,000	44.8	2,100	1,200	900
Physical therapist assistants and aides	07.0402	5219	12,500	18,000	44.0	1,100	600	500
Speech pathologists and audiologists	......	1220	38,000	53,500	39.2	2,900	1,700	1,200
Other health occupations:								
Dietitians	......	1306	45,000	52,000	15.6	2,800	800	2,000
Dispensing opticians	07.0601	5212	14,500	21,100	46.5	1,300	800	500
	17.2101	....	....	....	....	......	.....	......

See footnotes at end of table.

Table B-1. Employment, 1976 and 1985 (projected), and average annual openings, by occupation, 1976-85—Continued

Occupation	Vocational educational code[1]	HEGIS code[2]	Estimated employment, 1976	Projected employment, 1985	Percent change, 1976-85[3]	Annual average openings, 1976-85		
						Total	Employment change	Replacement needs[4]
Health services administrators	......	1202	160,000	230,000	45.0	16,000	8,000	8,000
Medical record administrators	......	1202	12,300	15,600	26.6	1,000	400	600
Pharmacists	......	1211	120,000	140,000	18.4	8,900	2,200	6,700
Social scientists:								
Anthropologists	......	2202	3,500	4,300	22.4	200	100	100
	......	2203	....	....	....	.....	.....	......
Economists	......	2204	115,000	148,000	27.4	6,400	3,500	2,900
Geographers	......	2206	10,000	12,500	25.3	600	300	300
Historians	......	2205	22,500	24,500	9.1	900	200	700
Political scientists	......	2207	14,000	15,300	7.0	400	100	300
Psychologists	......	2000	90,000	120,000	33.8	5,600	3,400	2,200
Sociologists	......	2009	19,000	21,700	14.5	800	300	500
Social service occupations:								
Counseling occupations:								
School counselors	......	0826	43,000	45,900	6.0	1,500	300	1,200
Employment counselors	......	....	6,400	(5)	(5)	(5)	(5)	(5)
Rehabilitation counselors	......	....	19,000	(5)	(5)	(5)	(5)	(5)
College career planning and placement counselors	14.0602	....	3,900	(5)	(5)	(5)	(5)	(5)
Other social service occupations:								
Cooperative extension service workers	....	....	16,000	18,000	12.5	600	200	400
Home economists	....	1300	141,000	143,000	1.4	6,100	200	5,900
Homemaker-home health aides	....	....	70,000	178,000	154.3	37,000	12,000	25,000
Park, recreation, and leisure workers	04.1800	2103	85,000	(5)	(5)	(5)	(5)	(5)
	....	5506	....	......	....	......	.....	......
Social service aides	....	5506	100,000	130,000	30.3	7,600	4,300	3,300
Social workers	....	2104	330,000	440,000	32.7	25,000	12,000	13,000
Art, design, and communications-related occupations:								
Performing artists:	....							
Actors and actresses	....	1007	13,000	15,000	15.4	600	200	400
Dancers	....	1008	8,000	9,900	23.8	500	200	300
Musicians	....	1004	127,000	153,000	20.5	7,200	2,900	4,300
	....	1005	....	....	....	......	....	......
	....	1006	....	....	....	......	.....	......
Singers	....	1007	23,000	27,000	17.4	1,200	400	800
Design occupations:								
Architects	....	0202	49,000	61,600	25.0	3,100	1,400	1,700
Commercial artists	17.0700	1009	67,000	80,000	19.4	3,600	1,500	2,100
Display workers (retail trade)	04.0100	....	36,000	40,000	11.1	1,900	500	1,400
	17.0702	....	....	.....	....	......	.....	......
Floral designers	04.0500	....	37,000	52,000	40.5	3,300	1,600	1,700
Industrial designers	17.0703	....	12,000	13,300	10.8	500	200	300
Interior designers	17.0701	0203	37,000	45,000	21.6	1,900	900	1,000
Landscape architects	......	0204	13,000	17,000	30.8	900	400	500
Photographers	......	1011	85,000	97,000	14.0	3,700	1,300	2,400

See footnotes at end of table.

Table B-1. Employment, 1976 and 1985 (projected), and average annual openings, by occupation, 1976-85—Continued

Occupation	Vocational educational code[1]	HEGIS code[2]	Estimated employment, 1976	Projected employment, 1985	Percent change, 1976-85[3]	Annual average openings, 1976-85		
						Total	Employment change	Replacement needs[4]
Communications-related occupations:								
Interpreters	......	....	175	([5])	([5])	([5])	([5])	([5])
Newspaper reporters	......	0602	40,500	46,000	13.9	2,100	600	1,500
Radio and television announcers	......	0603	26,000	34,500	32.2	1,300	900	400
Technical writers	......	....	22,000	([5])	([5])	([5])	([5])	([5])

[1] Vocational education codes are from *Vocational Education and Occupations* (U.S. Department of Health, Education, and Welfare, and U.S. Department of Labor, 1969).

[2] HEGIS codes are from the Higher Education General Information Survey. *See A Taxonomy of Industrial Programs in Higher Education.* (U.S. Department of Health, Education, and Welfare, 1970).

[3] Percentages calculated from unrounded numbers.

[4] Replacement needs include openings arising from deaths, retirements, and other separations from labor force. Does not include transfers to other occupations.

[5] Not available.

[6] Totals do not equal the sum of individual estimates because all branches of engineering are not covered seperately.

NOTE: Detail may not add to totals because of rounding.

Appendix C. Detailed Training Statistics

This appendix presents detailed statistics on the number of persons completing formal training programs. Table C-1 presents statistics for those occupations listed in appendix B that generally require less than a bachelor's degree for entry. Tables C-2 and C-3 present data on bachelor's, master's, doctor's, and first professional degrees awarded, by field of study.

Tables C-4 and C-5 present limited historical data on junior or community college graduates who are in occupation-related curriculums and on persons who have completed apprenticeship programs, respectively. Table C-6 presents data on enlisted military personnel trained in a particular occupational specialty, and tables C-7 and C-8 give data on vocational education completions.

Because data in these tables are fragmentary and inconsistent, they must be used with caution. In table C-1, data are not strictly comparable because different programs cover different time periods (fiscal years, calendar years, and academic years). Furthermore, many junior and community college completions in table C-5 and vocational education completions in C-7 do not match a specific occupation. Extensive footnotes indicate data limitations.

Table C-1. Available training data for occupations generally requiring less than a bachelor's degree

Occupation	Vocational education code	HEGIS code[2]	Public vocational education completions, Fy 1976	Private vocational education completions, 1975-76	Job corps completions, Fy 1976	Apprenticeship completions, 1976	Junior college graduates, 1975-76
Industrial production and related occupations:							
Foundry occupations:							
Patternmakers	17.2302	....	....	....	....	129	....
Molders	17.2301	....	....	....	....	147	....
Coremakers	17.2301	....	....	....	....		....
Machining occupations:							
All-round machinists	17.2302	....	....	....	....	2,526	....
Machine tool operators	17.2303	....	....	....	98	....	....
Setup workers (machine tools)	17.2302	....	....	....	....	212	....
Tool-and-die makers	17.2307	....	....	(1)	....	1,901	....
Printing occupations:[2]	17.1900	5009	17,859	....	....	1,374	587
Compositors	17.1906	....	....	....	....	264	....
Lithographers	17.1902	....	....	....	....	292	....
Printing press operators and assistants	17.1902	....	....	....	292	466	....
Bookbinders and bindery workers	17.1906	....	....	....	18	122	....
Other industrial production and related occupations:							
Assemblers	......	....	....	....	276	....	....
Blue-collar worker supervisors	17.1700	....	12,105	....	....	....	....
Boilermaking occupations ...	17.1099	....	....	....	....	508	....
Furniture upholsterers	17.3500	....	[3]4,336	600	125	....	....
Millwrights	17.1099	....	....	....	....	933	....

See footnotes at end of table.

Table C-1. Available training data for occupations generally requiring less than a bachelor's degree—Continued

Occupation	Vocational education code	HEGIS code	Public vocational education completions, Fy 1976	Private vocational education completions, 1975-76	Job corps completions, Fy 1976	Apprenticeship completions, 1976	Junior college graduates, 1975-76
Photographic laboratory occupations[4]	17.0900	5007	3,361	....	....	....	810
Stationary engineers	17.3200	....	2,350	....	....	288	....
Welders	17.2306	....	40,840	9,700	1,593	....	....
Offices occupations:	14.0000	....	[5]587.537	....	....	....	....
Clerical occupations:	....	....	....	....	[6]2,686	....	....
Bookkeeping workers	14.0102	....	....	....	76	....	....
Cashiers	14.0103	....	....	....	92	....	....
File clerks	14.0302	....	....	....	342	....	....
Office machine operators	14.0104	5005	....	....	10	....	....
Postal clerks	14.0403	....	....	....	78	....	....
Receptionists	14.0406	....	....	....	52	....	....
Secretaries and stenographers	14.0700	5005	151,541	33,700	145	....	[7]19,704
Stock clerks	14.0504	....	....	....	190	....	....
Typists	14.0900	5005	114,182	6,900	1,123	....	....
Computer and related occupations:	14.0200	....	....	....	....	....	....
Computer operating personnel	14.0201	5101	10,625	2,600	[8] 282	....	[8] 4,441
	14.0202	5102	....	8,400	....	....	....
Programmers	14.0203	0704	9,909	3,200	....	....	....
		5103	....	....	....	....	2,547
Administrative and related occupations:							
Accountants	....	5002	....	....	....	....	9,374
Hotel managers and assistants	....	0508	3,022	....	....	....	....
	....	5010	....	....	....	....	[9] 1,865
Service occupations:							
Cleaning and related occupations:							
Building custodians	17.1100	....	3,942	([1])	1,077	....	....
Hotel housekeepers and assistants	09.0205	....	....	([1])	....	....	....
Food service occupations:	....	....	....	[10] 3,800	....	....	....
Cooks and chefs	17.2902	....	....	....	[11]1,717	[11] 548	
Dining room attendants and dishwashers	......	....	....	....	69	....	....
Food counter workers	17.2904	....	....	....	66	....	....
Meatcutters	17.2903	....	....	....	121	853	....
Waiters and waitresses	17.2904	....	....	....	69	....	....
Personal service occupations:							
Barbers	17.2601	5006	810	5,000	2	[12] 347	....
Cosmetologists	17.2602	5006	18,309	49,400	87	....	....
Funeral directors and embalmers	17.0909	....	1,11	3,800	....	....	....
Private household service occupations:	09.0200	....	[13]94,247	....	....	....	....
Private household service workers	09.0201	....	215,669	....	....	....	....
	09.0202	....	19,740	200	....	....	....
	09.0203	....	34,034	....	....	....	....
	09.0204	....	5,503	....	....	....	....
	09.0205	....	2,078	....	....	....	....
Protective and related service occupations:							
Firefighters	17.2801	5507	....	....	....	....	3,234
Guards	17.2802	....	....	....	6	....	....

See footnotes at end of table.

Table C-1. Available training data for occupations generally requiring less than a bachelor's degree—Continued

Occupation	Vocational education code	HEGIS code	Public vocational education completions, Fy 1976	Private vocational education completions, 1975-76	Job corps completions, Fy 1976	Apprenticeship completions, 1976	Junior college graduates, 1975-76
Police officers[14]	17.2802	5505	....	100	....	....	18,698
Health and regulatory inspectors (government)	17.2899	5408	....	....	....	....	460
Other service occupations:							
Telephone operators	14.0401	....	....	....	25	....	....
Education and related occupations:							
Teaching occupations:							
Teacher aides	......	5503	....	....	....	....	5,840
Library occupations:							
Library technicians and assistants	14.0499	5504	....	....	1	....	594
Sales occupations:	04.0000	....	[15]221,767	[15] 44,800	....	....	[16]19,926
Automobile parts counter workers	04.0300	0509	....	....	63	....	....
Gasoline service station attendants	04.1600	5004	....	....	74	....	....
Real estate agents and brokers	04.1700	5004	17,452	21,200	....	....	....
Retail trade sales workers	04.0800	0509	[17]4,955	....	74	....	....
Wholesale trade sales workers	04.0800	0509	2,170	....	....	....	....
Construction occupations:							
Bricklayers, stonemasons, and marblesetters	17.1004	....	11,468	(1)	671	[18] 1,407	....
Carpenters	17.1001	....	39,712	200	1,959	6,211	....
Cement masons and terrazzo workers	17.1099	....	....	....	419	566	....
Construction laborers	17.1099	....	....	....	76	....	....
Drywall installers and finishers	17.1008	....	....	....	....	195	....
Electricians (construction)[19]	17.1002	....	15,371	500	604	6,563	
Floor covering installers	17.1099	....	....	....	....	283	....
Glaziers	17.1099	....	....	....	....	266	....
Insulation workers	17.1099	....	....	....	....	264	....
Ironworkers	17.1099	....	....	....	....	2,273	....
Lathers	17.1006	....	....	....	....	206	....
Operating engineers (construction machinery operators)	17.100302	...	....	....	633	945	....
Painters and paperhangers	17.1005	....	....	....	706	1,139	....
Plasterers	17.1006	....	....	....	202	153	....
Plumbers and pipefitters[20]	17.1007	....	6,707	100	176	6,061	....
Roofers	17.1010	....	....	....	....	482	....
Sheet-metal workers	17.2305	....	4,638	....	117	2,351	....
Occupations in transportation activities:							
Air transportation occupations:	17.0400	....	[21]4,143	....	....	....	....
Airplane mechanics	17.0401	....	....	1,400	....	48	....
Airplane pilots	16.0601	....	433	20,600	....	....	....
Driving occupations:							
Local truck drivers	......	....	....	....	[22]46	....	....
Scientific and technical occupations:							
Conservation occupations:							
Forestry technicians	01.0601	5403	....	....	175	....	2,133

See footnotes at end of table.

Table C-1. Available training data for occupations generally requiring less than a bachelor's degree—Continued

Occupation	Vocational education code	HEGIS code	Public vocational education completions, Fy 1976	Private vocational education completions, 1975-76	Job corps completions, Fy 1976	Apprenticeship completions, 1976	Junior college graduates, 1975-76
Other scientific and technical occupations:							
Drafters	17.1300	5304	29,317	1,900	77	246	....
Engineering and science technicians	16.0100	5300 5401 5407	28,234	6,000	....	[23] 354	[24]46,832
Surveyors	......	5309	....	....	....	....	2,219
Mechanics and repairers:							
Other mechanics and repairers:							
Air-conditioning, refrigeration, and heating mechanics	17.0100	5317	14,402	3,100	252	360	....
Appliance repairers	17.0200	5310	4,663	500	16	....	....
Automobile body repairers ..	17.0301	....	21,307	800	765	266	....
Automobile mechanics	17.0302	5306	82,656	3,900	1,669	1,343	....
Business machine repairers[25] ..	17.0600	5310	941	700	43	567	....
Computer service technicians .	16.0108	5105	....	....	....	....	188
Diesel mechanics	17.1200	5307	5,316	3,500	137	....	....
Farm equipment mechanics ...	01.0301	....	....	....	34	....	....
Industrial machinery repairers .	17.10031	....	....	....	61	920	....
Maintenance electricians	17.1400	....	....	100	29	1,106	....
Television and radio service technicians	17.1503	5310	....	1,500	33	108	....
Health occupations:							
Dental occupations:							
Dental assistants	07.0101	5202	5,883	5,000	39	....	1,425
Dental hygienists	07.0102	5203	1,378	....	....	....	3,538
Dental laboratory technicians ..	07.0103	5204	844	600	....	138	622
Medical technologists, technicians, and assistant occupations:							
Electrocardiograph technicians	07.0902	5217	....	200	28	....	[26] 66
Electroencephalographic technologists and technicians.	07.0901	5217	....	....	....	....	[26] 66
Medical laboratory workers ...	07.0200	1223	....	....	17	....	....
	07.0203	5205	2,953	100	....	....	3,313
	07.0299	....	1,768	2,300	....	....	....
Medical record technicians and clerks	14.0499	5213	....	....	62	....	....
Operating room technicians ..	07.0305	5211	1,106	....	....	....	252
Optometric assistants	07.0603	5212	....	....	....	....	519
Radiologic (X-ray) technologists	07.0501	5207	1,847	3,000	....	....	3,323
Respiratory therapy workers ..	07.0903	5215	1,707	....	5	....	2,080
Nursing occupations:							
Registered nurses[27]	07.0301	5208	16,740	1,000	....	....	34,187
Licensed practical nurses	07.0302	5209	36,759	3,400	66	....	2,794
Nursing aides, orderlies, and assistants	07.0303	....	28,819	4,100	1,790	....	....
Therapy and rehabilitation occups:							
Occupational therapy assistants .	07.0401	5210	....	....	....	....	560
Physical therapist assistants and aides	07.0402	5219	....	(1)	19		749
Other health occupations:							
Dispensing opticians	07.0601	5212	....	....	....	140	519

See footnotes at end of table.

Table C-1. Available training data for occupations generally requiring less than a bachelor's degree—Continued

Occupation	Vocational education code	HEGIS code	Public vocational education completions, Fy 1976	Private vocational education completions, 1975-76	Job corps completions, Fy 1976	Apprenticeship completions, 1976	Junior college graduates, 1975-76
Social service occupations:							
Social service aides	....	5506	....	....	....	....	3,009
Art, design, and communications-related occupations:							
Design occupations:							
Commercial artists	17.0700	1009	8,049	3,000	8	....	....
Photographers	....	1011	....	....	....	....	4810

[1] Less than 50 completions.

[2] Includes bookbinders, composing room occupations, lithographic occupations, press operators, and miscellaneous printing occupations.

[3] Includes some upholsterers other than furniture.

[4] May include other photographic occupations.

[5] Includes all persons who completed office occupation programs.

[6] Includes all persons who completed clerical occupation programs.

[7] Includes office machine training.

[8] Includes training for keypunch and other input and peripheral equipment operators, and general data processing workers.

[9] Includes restaurant management.

[10] Includes all persons who completed quantity food preparation programs.

[11] Includes bakers.

[12] Includes beauticians.

[13] Includes all persons who completed private household service occupation programs.

[14] May include some State police officers.

[15] Includes all distribution programs.

[16] Recipients of associate degrees in marketing, distribution, purchasing, business, and industrial management.

[17] Includes training for other occupations in retail trade.

[18] Includes tilesetters.

[19] Training data may include some maintenance electricians.

[20] Includes sprinkler fitters and steamfitters.

[21] Includes all persons who completed air transportation occupation programs.

[22] May include some over-the-road drivers.

[23] Electronics technicians.

[24] Includes an unknown number of workers trained for skilled craft occupations and technical occupations, such as industrial drafters.

[25] May include some computer service technicians.

[26] EEG and EKG technicians combined.

[27] Some graduates may be counted in both junior college and vocational education programs.

Table C-2. Bachelor's, master's, and doctor's degrees congerred by institutions of higher education, by field of study, 1975-76

Major field of study	Bachelor's degrees requiring 4 or 5 years	Second-level (master's) degrees	Doctor's degrees (Ph.D., Ed.D., etc.)
All fields	925,746	311,771	34,064
Agriculture and natural resources	19,402	3,340	928
Agriculture, general	1,730	323	6
Agronomy	958	303	178
Soil science	434	121	53
Animal science	3,868	442	135
Dairy science	296	77	21
Poultry science	91	33	10
Fish, game, and wildlife management	1,477	256	54
Horticulture	1,336	211	61
Ornamental horticulture	466	19	–
Agricultural and farm management	307	3	–
Agriculture economics	1,168	465	160
Agriculture business	917	26	1
Food science and technology	580	282	81
Forestry	2,660	405	92
Natural resources management	2,038	223	38
Agriculture and forestry technologies	167	23	5
Range management	174	39	18
Other	735	89	15
Architecture and environmental design	9,146	3,215	82
Environmental design, general	1,222	76	6
Architecture	5,607	1,318	18
Interior design	786	13	1
Landscape architecture	948	217	–
Urban architecture	1	153	–
City, community, and regional planning	448	1,411	51
Other	134	27	6
Area studies	3,079	945	182
Asian studies, general	236	138	7
East Asian studies	209	87	8
South Asian (India, etc.) studies	17	21	4
Southeast Asian studies	2	–	1
African studies	14	25	8
Islamic studies	–	2	2
Russian and Slavic studies	126	47	6
Latin American studies	302	152	6
Middle Eastern studies	81	23	9
European studies, general	54	2	1
Eastern European studies	10	1	–
West European studies	49	5	–
American studies	1,715	296	100
Pacific area studies	1	7	–
Other	263	139	30
Biological sciences	54,275	6,582	3,392
Biology, general	40,163	3,177	624
Botany, general	1,031	306	208
Bacteriology	442	56	28
Plant pathology	76	118	77
Plant pharmacology	–	–	–
Plant physiology	71	27	20
Zoology, general	5,492	528	276
Pathology, human and animal	13	101	101
Pharmacology, human and animal	15	76	163

Table C-2. Bachelor's, master's, and doctor's degrees conferred by institutions of higher education, by field of study, 1975-76—Continued

Major field of study	Bachelor's degrees requiring 4 or 5 years	Second-level (master's) degrees	Doctor's degrees (Ph. D., Ed. D., etc.)
Physiology, human and animal	313	229	226
Microbiology	2,485	529	336
Anatomy	3	93	123
Histology	–	1	–
Biochemistry	1,622	252	431
Biophysics	86	55	85
Molecular biology	191	23	71
Cell biology	61	9	25
Marine biology	429	133	18
Biometrics and biostatistics	13	77	25
Ecology	586	149	43
Entomology	272	219	143
Genetics	109	115	121
Radio biology	–	21	9
Nutrition, scientific	121	125	45
Neuro sciences	69	4	34
Toxicology	9	9	7
Embryology	–	2	1
Other	603	148	151
Business and management	143,436	42,620	956
Business and commerce, general	30,138	8,413	129
Accounting	35,806	2,730	55
Business statistics	197	149	15
Banking and finance	7,091	2,414	41
Investments and securities	11	61	–
Business management and administration	44,140	23,358	492
Operations research	345	458	53
Hotel and restaurant management	1,499	64	–
Marketing and purchasing	14,649	1,182	43
Transportation and public utilities	1,057	108	3
Real estate	689	79	4
Insurance	576	45	5
International business	269	1,198	8
Secretarial studies	1,538	1	1
Personnel management	1,325	715	5
Labor and industrial relations	1,105	763	17
Business economics	2,576	342	80
Other	425	540	5
Communications	21,282	3,126	204
Communications, general	7,571	1,549	162
Journalism	7,711	956	15
Radio/television	3,366	299	18
Advertising	1,236	88	–
Communication media	1,237	165	8
Other	161	69	1
Computer and information sciences	5,652	2,603	244
Computer and information sciences, general	4,530	2,349	221
Information	493	166	20
Data processing	483	1	–
Computer processing	3	–	–
Systems analysis	89	87	3
Other	54	–	–
Education	154,758	127,948	7,769
Education, general	4,020	17,884	1,497
Elementary education, general	60,264	22,748	196

Table C-2. Bachelor's, master's, and doctor's degrees conferred by institutions of higher education, by field of study, 1975-76—Continued

Major field of study	Bachelor's degrees requiring 4 or 5 years	Second-level (master's) degrees	Doctor's degrees (Ph. D., Ed. D., etc.)
Secondary education, general	4,996	7,585	210
Junior high school education	255	105	–
Higher education, general	14	388	345
Junior and community college education	–	234	220
Adult and continuing education	9	710	119
Special education, general	8,174	7,692	208
Administration of special education	10	123	17
Education of the mentally retarded	4,929	1,299	35
Education of the gifted	21	6	–
Education of the deaf	433	404	4
Education of the culturally disadvantaged	8	151	11
Education of the visually handicapped	142	98	3
Speech correction	2,716	711	9
Education of the emotionally disturbed	738	678	5
Remedial education	–	244	5
Special learning disabilities	831	1,790	6
Education of the physically handicapped	233	217	5
Education of the multiple handicapped	119	42	–
Social foundations	23	624	177
Educational psychology	370	2,356	576
Pre-elementary education	5,869	2,085	13
Educational statistics and research	5	74	38
Educational testing, evaluation, and measurement	3	208	28
Student personnel	194	17,396	677
Educational administration	32	11,823	1,497
Educational supervision	64	1,207	107
Curriculum and instruction	264	3,967	654
Reading education	227	6,840	117
Art education	4,565	1,044	48
Music education	7,908	1,382	80
Mathematics education	1,358	746	55
Science education	768	737	57
Physical education	24,181	4,761	215
Driver and safety education	110	271	4
Health education	2,019	1,149	72
Business, commerce, and distributive education	5,289	1,843	66
Industrial arts, vocational and technical education	7,271	3,002	231
Agricultural education	1,063	342	37
Education of exceptional children, not classified above	201	177	3
Home economic education	4,171	762	25
Nursing education	377	327	37
Other	514	1,716	60
Engineering	46,331	16,342	2,821
Engineering, general	3,168	1,305	236
Aerospace, aeronautical, astronautical engineering	1,009	479	139
Agricultural engineering	412	146	33
Architectural engineering	221	37	1
Bioengineering and biomedical engineering	193	178	58
Chemical engineering	3,140	1,031	308
Petroleum engineering	340	98	20
Civil, construction, and transportation engineering	7,923	2,999	370
Electrical, electronics, communications engineering	9,791	3,774	649
Mechanical engineering	6,800	1,907	305
Geological engineering	112	28	3
Geophysical engineering	52	3	–
Industrial and management engineering	2,203	1,751	121

Table C-2. Bachelor's, master's, and doctor's degrees conferred by institutions of higher education, by field of study, 1975-76—Continued

Major field of study	Bachelor's degrees requiring 4 or 5 years	Second-level (master's) degrees	Doctor's degrees (Ph. D., Ed. D., etc.)
Metallurgical engineering	351	176	72
Materials engineering	190	223	118
Ceramic engineering	147	52	19
Textile engineering	20	13	–
Mining and mineral engineering	331	70	18
Engineering physics	335	85	55
Nuclear engineering	418	466	131
Engineering mechanics	143	181	77
Environmental and sanitary engineering	213	568	49
Naval architecture and marine engineering	402	102	4
Ocean engineering	157	118	12
Engineering technologies	7,943	328	2
Other	317	224	21
Fine and applied arts	42,138	8,817	620
Fine arts, general	5,211	735	46
Art	14,252	2,252	19
Art history and appreciation	2,143	399	65
Music (performing, composition, and theory)	5,077	2,315	249
Music (liberal arts program)	3,827	814	77
Music history and appreciation	213	88	42
Dramatic arts	5,691	1,394	112
Dance	772	180	1
Applied design	3,350	255	1
Cinematography	448	161	4
Photography	846	115	–
Other	308	109	4
Foreign languages	15,471	3,531	864
Foreign languages, general	867	552	209
French	4,783	914	190
German	1,983	471	164
Italian	342	85	19
Spanish	5,984	1,080	176
Russian	531	81	13
Chinese	150	23	6
Japanese	146	8	1
Latin	169	42	2
Greek, classical	125	29	10
Hebrew	142	49	10
Arabic	10	7	2
Indian (Asiatic)	3	6	1
Scandinavian languages	27	4	4
Slavic languages (other than Russian)	111	79	36
African languages (non-Semitic)	2	6	–
Other	96	95	21
Health professions	53,958	12,556	577
Health professions, general	3,684	651	49
Hospital and health care administration	421	1,129	11
Nursing	26,726	3,035	16
Dental specialties	80	430	3
Medical specialties	31	108	33
Occupational therapy	1,453	166	–
Optometry	343	13	3
Pharmacy	6,869	307	81
Physical therapy	2,060	167	1
Dental hygiene	1,115	24	16

Table C-2. Bachelor's, master's, and doctor's degrees conferred by institutions of higher education, by field of study, 1975-76—Continued

Major field of study	Bachelor's degrees requiring 4 or 5 years	Second-level (master's) degrees	Doctor's degrees (Ph. D., Ed. D., etc.)
Public health	585	2,106	165
Medical record librarianship	521	–	–
Podiatry or Podiatric medicine	74	1	–
Biomedical communication	24	8	–
Veterinary medicine specialties	–	113	41
Speech pathology and audiology	3,925	3,119	109
Chiropractic	–	–	2
Clinical social work	145	671	–
Medical laboratory technologies	5,389	241	–
Dental technologies	35	–	–
Radiologic technologies	263	26	4
Other	215	241	43
Home economics	17,409	2,179	178
Home economics, general	6,176	689	23
Home decoration and home equipment	987	60	2
Clothing and textiles	2,577	144	10
Consumer economics and home management	666	97	18
Family relations and child development	3,466	566	67
Foods and nutrition	2,767	526	57
Institutional management and cafeteria management	397	54	–
Other	373	43	1
Law	531	1,442	76
Law, general	531	1,331	75
Other	–	111	1
Letters	51,515	11,293	2,447
English, general	31,696	5,960	1,061
Literature, English	2,453	631	228
Comparative literature	554	210	158
Classics	483	136	61
Linguistics	530	523	151
Speech, debate, and forensic science	6,380	1,614	201
Creative writing	246	280	3
Teaching of English as a foreign language	49	469	9
Philosophy	4,757	689	382
Religious studies	3,690	667	172
Other	677	114	21
Library science	843	8,037	71
Library science, general	822	7,762	64
Other	21	275	7
Mathematics	15,984	3,857	856
Mathematics, general	15,248	3,222	671
Statistics, mathematical and theoretical	248	471	141
Applied mathematics	440	157	43
Other	48	7	1
Military sciences	1,177	–	–
Military science (Army)	872	–	–
Naval science (Navy, Marines)	3	–	–
Aerospace science (Air Force)	61	–	–
Merchant marine	225	–	–
Other	16	–	–
Physical sciences	21,465	5,466	3,431
Physical sciences, general	1,224	283	65

Table C-2. Bachelor's, master's, and doctor's degrees conferred by institutions of higher education, by field of study, 1975-76—Continued

Major field of study	Bachelor's degrees requiring 4 or 5 years	Second-level (master's) degrees	Doctor's degrees (Ph. D., Ed. D., etc.)
Physics, general	3,456	1,421	968
Molecular physics	–	–	10
Nuclear physics	88	30	19
Chemistry, general	10,977	1,721	1,498
Inorganic chemistry	5	1	13
Organic chemistry	26	6	30
Physical chemistry	5	10	30
Analytical chemistry	2	7	7
Pharmaceutical chemistry	7	38	43
Astronomy	116	81	113
Astrophysics	50	8	13
Atmospheric sciences and meteorology	365	197	61
Geology	3,259	935	280
Geochemistry	10	6	4
Geophysics and seismology	89	62	29
Earth sciences, general	1,073	225	42
Paleontology	6	4	9
Oceanography	240	152	81
Metallurgy	16	24	16
Other earth sciences	167	107	26
Other physical sciences	284	148	74
Psychology	49,908	7,811	2,581
Psychology, general	48,818	5,218	2,047
Experimental psychology	98	96	64
Clinical psychology	63	442	320
Psychology for counseling	71	1,513	41
Social psychology	347	128	40
Psychometrics	9	37	–
Statistics in psychology	–	–	–
Industrial psychology	70	47	4
Developmental psychology	365	162	43
Physiological psychology	6	4	13
Other	61	164	9
Public affairs and services	33,238	17,106	319
Community services, general	1,788	717	19
Public administration	2,008	5,135	98
Parks and recreation management	5,182	571	15
Social work and helping services	10,852	8,943	163
Law enforcement and correction	12,507	1,197	9
International public service	109	129	3
Other	792	414	12
Social sciences	126,785	15,874	4,160
Social sciences, general	12,325	2,270	85
Anthropology	5,180	937	419
Archaeology	79	32	14
Economics	14,741	2,087	763
History	28,400	3,658	1,014
Geography	3,733	665	168
Political science and government	28,302	2,191	723
Sociology	27,634	2,009	729
Criminology	2,306	218	18
International relations	1,185	710	73
Afro-American (Black culture) studies	396	40	6
American Indian cultural studies	13	7	–
Mexican-American cultural studies	89	3	–
Urban studies	1,601	824	16

Table C-2. Bachelor's, master's, and doctor's degrees conferred by institutions of higher education, by field of study, 1975-76—Continued

Major field of study	Bachelor's degrees requiring 4 or 5 years	Second-level (master's) degrees	Doctor's degrees (Ph. D., Ed. D., etc.)
Demography	22	25	9
Other	779	198	123
Theology	5,520	3,290	1,033
Theological professions, general	3,461	1,537	960
Religious music	251	156	14
Biblical languages	30	32	11
Religious education	1,529	1,384	29
Other	249	181	19
Interdisciplinary studies	32,443	3,791	273
General liberal arts and sciences	14,736	1,758	36
Biological and physical sciences	3,935	318	38
Humanities and social sciences	4,119	875	126
Engineering and other	340	149	16
Other	9,313	691	57

SOURCE: U.S. Department of Health, Education, and Welfare, National Center for Education Statistics.

Table C-3. First professional degrees[1] conferred by institutions of higher education, 1975-76

Field of study	First professional degrees	Field of study	First professional degrees
Total, all institutions	62,649		
Chiropractic (D.C.)	1,577	Podiatry (Pod. D. or D.P.) or Pediatry Medicine (D.P.M.)	428
Dentistry (D.D.S. or D.M.D.)	5,425	Veterinary Medicine (D.V.M.)	1,532
Medicine (M.D.)	13,426	Law (LL.B. or J.D.)	32,293
Optometry (O.D.)	975	Theology (B.D., M. Div., or Rabbi)	5,706
Osteopathy (D.O.)	818	Other	30
Pharmacy (Pharm. D.)	439		

[1] Includes degrees which require at least 6 years of college work for completion (including at least 2 years of preprofessional training).

SOURCE: U.S. Department of Health, Education, and Welfare, National Center for Education Statistics.

Table C-4. Apprentice completions in selected trades, 1962-76

Trade	1962	1963	1964	1965	1966	1967[1]	1968[2]	1969[3]	1970	1971	1972	1973	1974	1975	1976
Construction trades:[4]															
Asbestos and insulation workers	–	–	–	–	–	–	–	–	–	312	282	365	295	354	264
Bricklayers, stone and tilesetters	1,527	1,484	1,389	1,342	1,346	1,602	1,206	1,651	1,801	1,431	1,998	1,400	1,184	1,418	1,407
Carpenters	2,986	3,013	2,882	3,272	3,340	4,249	3,423	3,698	3,083	3,639	5,054	5,719	5,211	5,669	6,211
Cement masons	327	312	222	297	293	372	386	300	273	384	825	460	526	664	566
Dry-wall finishers	–	–	–	–	–	–	–	–	–	–	–	446	404	390	195
Electricians	3,279	3,148	3,887	3,327	3,654	6,075	4,742	5,091	5,224	4,364	5,991	5,730	6,138	6,003	6,563
Glaziers	202	201	266	222	239	223	244	217	228	248	335	296	297	337	266
Lathers	387	216	240	268	198	466	290	145	202	188	276	214	278	236	206
Operating engineers	–	–	–	–	–	–	–	–	–	439	1,035	848	829	932	945
Painters	790	895	770	969	807	1,019	868	829	832	992	983	909	1,057	1,148	1,139
Plasterers	290	338	267	181	215	264	201	228	161	161	245	176	183	230	153
Plumbers-pipefitters	3,409	2,924	3,101	3,050	2,736	3,601	3,788	4,888	4,266	4,880	5,255	4,656	5,766	5,560	5,764
Roofers	228	197	282	272	241	379	226	290	278	257	383	426	391	447	482
Sheet-metal workers	1,749	1,558	1,742	1,477	1,568	2,184	2,401	2,544	2,309	2,401	2,768	2,775	2,548	2,302	2,351
Sprinkler fitters	–	–	–	–	–	–	–	–	–	200	408	187	424	449	297
Structural iron workers	896	773	732	870	1,075	1,387	1,209	2,006	1,536	1,381	2,098	1,801	1,513	1,952	2,223
Construction workers not classified above	–	–	–	–	–	–	–	–	1,221	451	552	87	112	115	50
Metalworking trades:															
Boilermakers	59	59	52	111	91	199	135	180	364	405	504	353	367	340	508
Machine set-up and operators	–	–	–	–	–	–	–	–	–	–	–	112	141	144	212
Machinists	1,011	1,330	1,309	1,339	1,616	2,367	2,108	3,527	3,822	3,234	3,695	2,357	2,047	1,905	2,526
Patternmakers	195	150	131	160	150	326	350	395	444	290	275	166	181	158	129
Toolmakers, diemakers	1,339	1,367	1,489	1,293	1,704	3,596	2,502	4,125	4,748	3,482	3,825	2,716	2,051	1,849	1,901
Not classified above	211	227	164	240	446	1,040	690	541	1,673	446	531	–	–	–	–
Graphic art trades:															
Bookbinders	246	453	235	182	160	116	170	315	223	142	231	81	151	159	122
Compositors	869	730	666	675	559	807	810	837	774	623	844	377	442	475	264
Lithographers, photoengravers	399	584	640	329	444	469	325	839	987	320	518	183	587	212	292
Press operators	611	598	551	304	423	517	721	826	637	354	635	507	684	635	466
Not classified above	161	154	175	75	106	164	98	160	279	285	478	387	647	326	230
Miscellaneous trades:[4]															
Air-conditioning and refrigeration mechanics	–	–	–	–	–	–	–	–	–	–	–	153	293	212	360
Aircraft mechanics	–	–	–	–	–	–	–	–	–	149	65	53	36	26	48
Automotive body builders-repairers	154	117	135	133	151	218	214	211	595	307	308	238	310	275	266
Automotive mechanics	559	443	517	334	529	525	705	1,017	641	774	1,269	1,231	1,341	1,297	1,343
Barbers, beauticians	–	–	–	–	–	–	–	–	–	–	–	176	316	315	347
Butchers, meatcutters	401	350	369	448	531	631	756	362	727	817	997	794	919	661	853
Cabinetmakers-millworkers	248	243	213	207	235	177	164	120	186	212	278	241	268	285	294
Car repairers	20	42	13	24	9	77	140	82	101	138	128	174	185	298	290
Cooks, bakers	27	29	34	40	29	22	47	80	91	261	229	105	226	135	548
Dental technicians	25	23	18	32	13	30	59	65	92	78	145	88	117	106	138
Drafters	197	131	128	126	182	243	311	447	538	528	453	273	338	220	246
Electrical workers	339	371	251	277	382	583	591	319	446	1,074	1,691	833	835	778	1,106
Electronic technicians	–	–	–	–	–	–	–	–	–	377	400	163	217	125	354
Floor coverers	–	–	–	–	–	–	–	–	–	316	256	294	300	324	283
Line erectors, light and power	169	183	201	219	236	552	412	617	943	621	586	669	1,159	1,117	1,151
Maintenance mechanics (repairers)	552	439	322	354	442	718	1,072	1,293	1,682	1,253	1,846	774	731	662	920
Millwrights	191	218	251	165	270	780	331	615	763	695	1,080	786	624	794	933
Molders, coremakers	83	106	126	110	112	199	212	281	200	–	–	67	87	123	147
Office machine servicers	–	–	–	–	–	–	–	–	–	–	–	199	387	479	567
Optical workers	43	24	18	24	–	–	–	–	–	–	–	67	153	142	140
Radio and TV repairers	–	–	–	–	–	–	–	–	–	–	–	156	248	222	108
Stationary engineers	73	112	98	161	125	141	75	119	80	–	–	130	168	179	288
Not classified above	–	–	–	–	–	–	–	–	1,447	2,146	3,304	2,182	2,742	2,581	2,985

[1] Figures are understated because detailed data for Florida and Louisiana were not reported.

[2] Figures are understated because detailed data for Florida were not reported.

[3] Figures are understated because detailed data for California and Florida were not reported.

[4] It was not possible to provide a historical series for several trades because they were either recently listed as a separate trade (i.e., moved from a not elsewhere classified category), or were consolidated with one or more related occupations.

NOTE: Dash indicates data not available

SOURCE: U.S. Department of Labor, Bureau of Apprenticeship and Training.

Table C-5. Associate degrees and other formal awards below the baccalaureate granted in occupational curriculums, 1969-70 to 1975-76[1]

HEGIS code[2]	Curriculum	Academic year						
		1969-70	1970-71	1971-72	1972-73	1973-74	1974-75	1975-76
	All curriculums	124,327	153,549	190,039	174,101	201,538	217,949	243,101
5000	Business and commerce technologies	–	51,037	61,077	55,311	65,326	68,036	79,179
5001	Business and commerce technologies, general	14,666	11,008	12,781	11,402	12,379	14,325	17,392
5002	Accounting technologies	4,824	5,301	6,583	6,331	7,880	8,208	9,374
5003	Banking and finance technologies	–	272	349	460	1,605	642	890
5004	Marketing, distribution, purchasing, business and industrial management	4,048	9,237	10,155	9,989	13,559	14,065	19,926
5005	Secretarial technologies (includes office machines training)	15,388	16,534	20,355	15,526	18,650	19,229	19,704
5006	Personal service technologies (flight attendant, cosmetologist, etc.)	–	1,262	1,297	552	468	580	632
5007	Photography technologies	–	577	619	661	645	734	810
5008	Communications and broadcasting technologies (radio/television, newspapers)	–	728	986	1,032	1,292	1,525	1,850
5009	Printing and lithography technologies	–	512	600	450	535	584	587
5010	Hotel and restaurant management technologies	–	916	1,258	1,451	1,852	2,037	1,865
5011	Transportation and public utilities technologies	–	324	409	467	462	521	627
5012	Applied arts, graphic arts, and fine arts technologies (includes advertising design)	4,249	2,998	3,873	4,107	4,594	4,161	4,814
5099	Other	–	1,368	1,832	2,883	1,405	1,425	708
5100	Data processing technologies	6,487	8,745	8,971	7,640	6,998	6,821	7,176
5101	Data processing technologies, general	–	5,027	5,669	4,584	4,360	3,912	3,989
5102	Keypunch operator and other input preparation technologies	–	648	402	327	133	237	202
5103	Computer programmer technologies	–	2,149	2,198	2,118	2,018	2,199	2,547
5104	Computer operator and peripheral equipment operation technologies	–	387	431	249	205	240	229
5105	Data processing equipment maintenance technologies	–	431	104	103	226	179	188
5199	Other	–	103	167	259	56	54	21
5200	Health services and paramedical technologies	26,778	34,518	45,412	42,910	51,207	57,943	61,918
5201	Health services assistant	–	258	202	121	771	1,683	2,367
5202	Dental assistant technologies	1,663	2,191	2,779	1,255	1,197	1,341	1,425
5203	Dental hygiene technologies	2,229	2,506	3,113	3,465	3,738	3,717	3,538
5204	Dental laboratory technologies	362	264	374	414	594	643	622
5205	Medical or biological laboratory assistant technologies	970	1,335	1,826	1,902	2,617	3,238	3,313
5206	Animal laboratory assistant technologies	–	55	162	202	387	502	728
5207	Radiologic technologies (X-ray, etc.)	647	1,139	1,727	2,157	2,758	3,035	3,323
5208	Nursing, R.N. (less than 4-year program)	11,730	14,408	18,211	23,252	28,158	31,994	34,187
5209	Nursing, practical (L.P.N. or L.V.N.–less than 4-year program)	6,102	7,708	9,939	2,637	2,447	2,486	2,794
5210	Occupational therapy technologies	166	243	287	435	491	485	560
5211	Surgical technologies	133	244	423	110	183	207	252
5212	Optical technologies (includes ocular care, ophthalmic, optometric technologies)	60	81	146	215	395	438	519
5213	Medical record technologies	–	374	447	581	627	753	919
5214	Medical assistant and medical office assistant technologies	–	1,256	1,828	1,340	1,623	1,845	2,046
5215	Inhalation therapy technologies	–	570	982	1,542	1,824	2,103	2,080
5216	Psychiatric technologies (includes mental health aide programs)	–	634	842	1,138	1,785	1,862	1,730
5217	Electrodiagnostic technologies (includes EKG, EEG, etc.)	23	22	55	29	24	55	66
5218	Institutional management technologies (rest home, etc.)	–	176	225	22	64	89	81
5219	Physical therapy technologies	–	239	355	469	717	839	749
5299	Other	–	815	1,489	1,624	807	628	619

See footnotes at end of table.

Table C-5. Associate degrees and other formal awards below the baccalaureate granted in occupational curriculums, 1969-76 to 1975-76[1] – Continued

HEGIS code[2]	Curriculum	Academic year						
		1969-70	1970-71	1971-72	1972-73	1973-74	1974-75	1975-76
5300	Mechanical and engineering technologies	28,959	37,437	44,145	34,781	37,631	40,775	45,169
5301	Mechanical and engineering technologies, general	–	2,560	2,925	2,455	3,295	2,436	3,506
5302	Aeronautical and aviation technologies	1,672	2,173	2,656	2,378	2,060	2,208	1,983
5303	Engineering graphics (tool and machine drafting and design)	–	2,917	2,907	2,122	2,385	2,477	2,587
5304	Architectural drafting technologies	–	1,938	2,369	1,897	2,249	2,583	2,445
5305	Chemical technologies (includes plastics)	556	589	529	576	555	590	632
5306	Automotive technologies	–	4,041	5,109	3,676	4,300	4,507	4,714
5307	Diesel technologies	–	721	835	603	785	926	943
5308	Welding technologies	–	1,097	1,548	652	579	842	1,063
5309	Civil technologies (surveying, photogrammetry, etc.)	1,537	1,637	2,095	2,290	2,203	2,219	2,331
5310	Electronics and machine technologies (television, appliance, office machine repair, etc.)	–	7,851	9,129	6,397	7,470	8,638	11,145
5311	Electromechanical technologies	–	1,301	1,530	1,179	1,670	2,333	2,549
5312	Industrial technologies	1,755	1,657	2,313	1,315	1,928	2,011	2,051
5313	Textile technologies	–	155	244	245	223	242	329
5314	Instrumentation technologies	207	203	189	276	259	340	360
5315	Mechanical technologies	9,391	2,749	2,678	1,954	2,496	2,193	2,451
5316	Nuclear technologies	38	65	79	88	77	98	169
5317	Construction and building technologies (carpentry, electric work, plumbing, sheet-metal, air conditioning, heating, etc.)	–	4,299	4,927	3,648	4,652	5,632	5,285
5399	Other	–	1,554	2,083	3,030	508	500	626
5400	Natural science technologies	–	7,028	9,418	9,242	11,496	12,966	13,316
5401	Natural science technologies, general	–	656	795	648	768	785	1,004
5402	Agriculture technologies (includes horticulture)	2,596	2,870	3,321	3,440	4,470	4,823	5,238
5403	Forestry and wildlife technologies (includes fisheries)	727	1,087	1,523	1,671	1,980	2,203	2,133
5404	Food services technologies	–	693	886	704	1,581	2,046	2,138
5405	Home economics technologies	841	872	1,210	1,042	1,542	1,770	1,406
5406	Marine and oceanographic technologies	–	183	334	378	414	544	413
5407	Laboratory technologies, general	–	144	162	189	211	261	246
5408	Sanitation and public health inspection technologies (environmental health technologies)	–	145	632	346	464	437	460
5499	Other	–	378	555	874	66	97	278
5500	Public-service-related technologies	–	14,784	21,016	24,167	28,880	31,408	36,343
5501	Public service technologies, general	–	277	504	509	834	914	2,003
5502	Bible study or religion-related occupations	642	744	929	612	558	1,071	1,011
5503	Education technologies (teacher aide and 2-year teacher training programs)	3,218	3,856	5,170	4,839	5,840	6,189	5,840
5504	Library assistant technologies	313	471	571	586	506	607	594
5505	Police, law enforcement, correction technologies	4,084	6,873	9,204	11,658	14,915	15,639	18,698
5506	Recreation and social work and related technologies	–	1,146	1,965	2,269	3,731	3,712	3,009
5507	Fire control technology	–	735	1,205	1,448	2,013	2,188	3,234
5508	Public administration and management technologies	–	111	186	240	354	491	741
5509	Other	–	571	1,282	2,008	129	597	1,213

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[1] These data do not include associate degrees and other formal awards below the baccalaureate granted in arts and sciences curriculums.

[2] HEGIS codes are from the Higher Education General Information Survey. See *A Taxonomy of Instructional Programs in Higher Education* (U.S. Department of Health, Education, and Welfare, 1970).

SOURCE: U.S. Department of Health, Education, and Welfare, National Center for Education Statistics.

NOTE: Dash means data are not available or there were no programs.

Table C-6. Enlisted strength in Department of Defense occupational groups, September 30, 1977

DOD code	Group title and description of coverage	Enlisted strength
0	INFANTRY, GUN CREWS, AND SEAMANSHIP SPECIALISTS	259,647
01	*Infantry* – Includes weapon specialists, ground reconnaisance specialists and crew-served artillery specialists, armor and amphibious crew, and specialists in combat engineering and seamanship	120,184
02	*Armor and Amphibious*	23,704
03	*Combat Engineering* – Includes specialists in hasty and temporary construction of airfields, roads and bridges, and in demolition, field illumination, and chemical warfare	20,773
04	*Artillery/Gunnery, Rockets, and Missiles* – Includes conventional field, anti-air and shipboard guns and artillery, and rocket and missile specialists	54,475
05	*Air Crew* – Includes pilots and navigators, flight engineers, and other air crew	6,131
06	*Seamanship* – Includes boatswains, navigators, and other seamanship specialists	14,085
07	*Installation Security* – Includes specialists who guard weapon systems, defend installations, and protect personnel, equipment, and facilities	20,295
1	ELECTRONIC EQUIPMENT REPAIRERS	164,162
10	*Radio/Radar* – Includes fixed and mobile radio, air traffic and tracking radar, communication, navigation, and electronic countermeasure gear	78,702
11	*Fire Control Electronic System (Non-Missile)*	9,203
12	*Missile Guidance, Control and Checkout* – Includes specialists in guidance, control and checkout equipment for guided and ballistic missiles	22,162
13	*Sonar Equipment* – Includes specialists in underwater detection and fire control systems, oceanographic equipment, and related anti-submarine gear	6,927
14	*Nuclear Weapons Equipment*	1,524
15	*ADP Computers*	7,284
16	*Teletype and Cryptographic Equipment*	15,366
19	*Other Electronic Equipment* – Includes training devices, inertial navigation systems, and electronics instruments specialists	22,994
2	COMMUNICATIONS AND INTELLIGENCE SPECIALISTS	148,977
20	*Radio and Radio Code* – Includes operators of radio, radio teletype, and visual communications equipment	43,268
21	*Sonar*	4,091
22	*Radar and Air Traffic Control*	26,434
23	*Signal Intelligence/Electronic Warfare* – Includes the intercept, translation, and analysis of foreign communications, and the operation of electronic countermeasures equipment	22,929
24	*Intelligence* – Includes the gathering, receipt, and analysis of non-signal intelligence data, the interrogation of prisoners, other language translators and interpreters, image interpretation, and specialists in counterintelligence and investigational activities	9,550
25	*Combat Operations Control* – Includes specialists in forward area tactical operations and intelligence and in command post control activities	18,563
26	*Communications Center Operations* – Includes the receipt and distribution of messages, the operation of communications center equipment, and the operation of major field communications systems	24,142
3	MEDICAL AND DENTAL SPECIALISTS	78,690
30	*Medical Care*	54,360
31	*Technical Medical Services* – Includes laboratory, pharmaceutical, and X-ray services	10,964
32	*Related Medical Services* – Includes specialists in sanitation, health preservation and veterinary services, and preventive medical services	4,969
33	*Dental Care* – Includes specialists in dental care and treatment and in related technical and laboratory services	8,397

Table C-6. Enlisted strength in Department of Defense occupational groups, September 30, 1977—Continued

DOD code	Group title and description of coverage	Enlisted strength
4	OTHER TECHNICAL AND ALLIED SPECIALISTS	36,731
40	*Photography* – Includes still, motion, and television camera operators, precision photographic processing, editing, and broadcasting	5,837
41	*Mapping, Surveying, Drafting, and Illustrating*	7,880
42	*Weather* – Includes specialists in the collection of weather and sea condition data and in weather forecasting	5,609
43	*Ordnance Disposal and Diving* – Includes the excavation and rendering safe of explosive ordnance and of chemical and nuclear agents, and underwater demolition and other types of diving	1,438
45	*Musicians*	5,416
49	*Technical Specialists, N.E.C.* – Includes physical science laboratory analysts, specialists in memorial activities, safety, NBC warfare, and firefighting and damage control, and other technical specialists and aides such as scientific engineering assistants	10,551
5	FUNCTIONAL SUPPORT AND ADMINISTRATION	265,674
50	*Personnel* – Includes specialists in personnel administration, personnel and manpower management, and recruiting and counseling	42,664
51	*Administration* – Includes clerks, typists, and stenographers and legal and medical administrative specialists	72,230
52	*Clerical/Personnel* – Includes combined personnel and administrative specialists and senior enlisted personnel whose primary responsibilities are non-technical	7,901
53	*Data Processing* – Includes computer operators, analysts, and programmers and electric accounting machine operators	13,476
54	*Accounting, Finance, and Disbursing*	14,877
55	*Other Functional Support* – Includes specialists who provide support in the functional areas of supply accounting and procurement, transportation, flight operations and related areas	103,008
56	*Religious, Morale, and Welfare* – Includes chaplains' assistants and specialists in theater, arts, sports, and related activities	5,247
57	*Information and Education* – Includes specialists in public affairs, radio/TV, and other types of information and education	6,271
6	ELECTRICAL/MECHANICAL EQUIPMENT REPAIRERS	340,936
60	*Aircraft and Related* – Includes aircraft engines, electrical systems, structural components and surfaces, and launch equipment	153,539
61	*Automotive* – Includes construction equipment and other wheel and track vehicles	50,795
62	*Wire Communications* – Includes specialists in the installation and maintenance of telephones, switchboards, and central office and related interior communications equipment	27,786
63	*Missile, Mechanical and Electrical* – Includes missiles and missile systems and related components	4,631
64	*Armament and Munitions* – Includes small arms, artillery, mines, bombs and associated mountings, nuclear weapons, and ammunition renovation	32,416
65	*Shipboard Propulsion* – Includes marine main engines, boilers, and auxiliary equipment	34,686
66	*Power Generating Equipment* – Includes nuclear power reactors and primary electric generating plants	31,209
67	*Precision Equipment* – Includes optical and other precision instruments and office machines	4,041
69	*Other Mechanical and Electrical Equipment* – Includes specialists in the maintenance and repair of mechanical and electrical equipment which is not readily classifiable in another group	1,833
7	CRAFT WORKERS	71,897
70	*Metalworking* – Includes specialists in the machining, shaping, and forming of metal and in the fabrication of metal parts	13,907
71	*Construction* – Includes specialists in construction trades and construction equipment operation	25,088

Table C-6. Enlisted strength in Department of Defense occupational groups, September 30, 1977—Continued

DOD code	Group title and description of coverage	Enlisted strength
72	*Utilities* – Includes plumbers, heating and cooling specialists, and electricians	19,263
74	*Lithography*	1,854
75	*Industrial Gas and Fuel Production* – Includes specialists in the production of liquid oxygen, hydrogen, nitrogen, and carbon dioxide	1,017
76	*Fabric, Leather, and Rubber.*	2,668
79	*Other Craft Workers, N.E.C.* – Includes specialists in trades such as molding, camouflage, and plastic work, which are not readily classifiable elsewhere in this section.	8,102
8	SERVICE AND SUPPLY HANDLERS.	161,606
80	*Food Service.*	50,710
81	*Motor Transport* – Includes the operation of wheel and track vehicles (except construction equipment) and railway equipment	32,631
82	*Material Receipt, Storage, and Issue* – Includes specialists in the receipt, storage, issue, and shipment of general and specialized classes of supplies, excluding ammunition	30,657
83	*Law Enforcement* – Includes military police, protective and corrections specialists, and criminals and non-criminal inspectors and investigators	40,295
84	*Personal Service* – Includes laundry, dry cleaning, and related services	1,911
85	*Auxiliary Labor* – Includes unskilled laborers and their supervisors	1
86	*Forward Area Equipment* – Includes specialists in parachute packing and repair, in aerial delivery operations, and in flight equipment fitting and maintenance	5,401
87	*Other Services, N.E.C.* – Includes service specialists who are not readily classifiable in one of the other groups in this section.	0

Note: Definitions are provided for most occupational groups. The lack of explanatory material for a few occupational groups indicates that the title of the grouping is considered a sufficient definition.

SOURCE: U.S. Department of Defense, Defense Manpower Data Center – requested tabulation.

Table C-7. Enrollments and completions in public vocational education by Office of Education instructional program, fiscal year 1976

OE instructional code and title	Enroll-ments	Comple-tions
Total (unduplicated)	15,133,322	1,934,693
01. Agriculture[1]	1,059,717	148,761
01.0100 Agricultural production	575,085	67,360
01.0200 Agricultural supplies/services	29,476	7,854
01.0300 Agricultural mechanics	147,832	30,532
01.0400 Agricultural products	15,450	2,844
01.0500 Ornamental horticulture	118,370	21,522
01.0600 Agricultural resources	28,355	4,885
01.0700 Forestry	19,763	4,812
01.9900 Other	125,386	8,952
04. Distribution[1]	900,604	221,767
04.0100 Advertising services	15,761	4,622
04.0200 Apparel and accessories	25,344	7,741
04.0300 Automotive	9,207	3,218
04.0400 Finance and credit	55,296	9,567
04.0500 Floristry	8,316	2,617
04.0600 Food distribution	35,972	11.819
04.0700 Food services	47,458	16,893
04.0800 General merchandise	290,161	91,965
04.0900 Hardware, building materials	7,453	2,139
04.1000 Home furnishings	4,370	1,042
04.1100 Hotel and lodging	18,192	3,022
04.1200 Industrial marketing	26,696	2,011
04.1300 Insurance	14,293	1,969
04.1400 International trade	726	216
04.1500 Personal services	18,181	6,331
04.1600 Petroleum	4,783	1,469
04.1700 Real estate	131,999	17,452
04.1800 Recreation and tourism	24,383	3,623
04.1900 Transportation	18,050	4,155
04.2000 Retail trade, other	17,180	4,955
04.3100 Wholesale trade, other	3,859	2,170
04.9900 Other	122,924	22,771
07. Health[1]	684,904	159,986
07.0101 Dental assistant	21,248	5,883
07.0102 Dental hygiene (associate)	6,427	1,378
07.0103 Dental laboratory technology	4,345	844
07.0199 Other dental	254	84
07.0203 Medical laboratory assisting	15,871	2,953
07.0299 Other medical laboratory technology	7,153	1,768
07.0301 Nursing, associate degree	104,939	16,740
07.0302 Practical (vocational) nursing	98,294	36,759
07.0303 Nursing assistant (aide)	116,622	29,819
07.0305 Surgical technician	3,143	1,106
07.0399 Other nursing	42,648	3,592
07.0401 Occupational therapy	2,658	464
07.0402 Physical therapy	3,099	596
07.0499 Other rehabilitation	1,548	351
07.0501 Radiologic technology	10,174	1,847
07.0503 Nuclear medical technology	192	55
07.0599 Other radiologic	5,438	1,177
07.0600 Ophthalmic	1,691	268
07.0700 Environmental health	2,513	215
07.0800 Mental health technology	15,736	1,733
07.0903 Inhalation therapy technology	8,748	1,707
07.0904 Medical assisting	24.988	5,903
07.0906 Health aide	15,234	4,816
07.0907 Medical emergency technician	54,181	24,065
07.0909 Mortuary science	719	111
07.9900 Other	117,041	15,752
09.01 Consumer and homemaking[1]	3,515,042	53,466
09.0101 Comprehensive homemaking	1,629,107	6,098
09.0102 Child development	193,300	735
09.0103 Clothing and textiles	340,221	6,248
09.0104 Consumer education	155,107	1,317
09.0106 Family relations	181,517	896
09.0107 Food and nutrition	338,242	2,951
09.0108 Home management	41,299	64
09.0109 Housing and home furnishings	130,066	3,015
09.0199 Other	506,183	32,142
09.02 Occupational preparation[1]	471,289	94,247
09.0201 Care and guidance of children	144,208	25,669
09.0202 Clothing management, production, and services	105,766	19,740
09.0203 Food management, production, and services	137,284	34,034
09.0204 Home furnishing, equipment, and services	33,198	5,503
09.0205 Institutional and home management, and services	12,082	2,078
09.0299 Other	38,751	7,223
14. Office occupations[1]	3,114,692	587,537
14.0100 Accounting and computing occupations	511,998	95,392
14.0201 Computer and console operators	41,747	10,625
14.0203 Programmers	43,242	9,909
14.0299 Other business data processing	109,543	20,944
14.0300 Filing, office machines, clerical occupations	592,608	126,487
14.0400 Information, communication occupations	41,673	6,143
14.0500 Materials support, transportation, etc.	6,843	1,080
14.0600 Personnel, training, and related occupations	46,216	9,066
14.0700 Stenography, secretarial, and related occupations	699,844	151,541
14.0800 Supervisory and administrative management occupations	147,658	22,013
14.0900 Typing and related occupations	656,043	114,182
14.9900 Other	217,277	20,155
16. Technical[1]	484,807	61,271
16.0101 Aeronautical technology	5,279	656
16.0103 Architectural technology	25,090	2,610
16.0104 Automotive technology	10,725	1,952
16.0105 Chemical technology	5,167	794
16.0106 Civil technology	28,904	3,553
16.0107 Electrical technology	24,117	2,400
16.0108 Electronic technology	84,412	12,974
16.0109 Electromechanical technology	6,380	726

See footnotes at end of table.

Table C-7. Enrollments and completions in public vocational education by Office of Education instructional program, fiscal year 1976—Continued

OE instructional code and title	Enroll-ments	Comple-tions
16.0110 Environmental control technology	8,192	891
16.0111 Industrial technology	20,829	2,404
16.0112 Instrumentation technology	3,466	304
16.0113 Mechanical technology	28,659	3,891
16.0114 Metallurgical technology	4,349	657
16.0117 Scientific data technology	18,644	3,688
16.0601 Commercial pilot training	8,211	433
16.0602 Fire and safety technology	24,607	2,802
16.0603 Forestry technology	4,174	405
16.0604 Oceanographic technology	1,753	186
16.0605 Police science	91,417	10,355
16.9901 Air pollution technology	39	0
16.9902 Water and waste water technology	3,358	617
16.9900 Other	62,562	7,997
17. Trade and industrial[1]	3,109,950	591,477
17.0100 Air conditioning	78,275	14,402
17.0200 Appliance repair	20,171	4,663
17.0301 Body and fender repair	80,245	21,307
17.0302 Auto mechanic	365,534	82,656
17.0399 Other automotive	71,640	7,309
17.0400 Aviation occupations	26,047	4,143
17.0500 Blueprint reading	12,765	1,716
17.0600 Business machine maintenance	4,480	941
17.0700 Commercial art occupations	48,699	8,049
17.0800 Commercial fishery occupations	3,577	439
17.0900 Commercial photographic occupations	30,682	3,361
17.1001 Carpentry, construction	153,730	39,712
17.1002 Electricity, construction	66,524	15,371
17.1004 Masonry	43,890	11,468
17.1007 Plumbing and pipefitting	44,429	6,707
17.1099 Other construction and maintenance trades	140,223	20,730
17.1100 Custodial services	17,339	3,942
17.1200 Diesel mechanic	21,953	5,316
17.1300 Drafting occupations	151,434	29,317
17.1400 Electrical occupations	97,249	10,985
17.1500 Electronic occupations	140,173	26,266
17.1600 Fabric maintenance services	4,364	942
17.1700 Supervisor and management development	112,991	12,105
17.1900 Graphic arts occupations	101,035	17,859
17.2000 Industrial atomic energy occupations	395	17[illegible]
17.2100 Instrument maintenance and repair occupations	3,739	470
17.2200 Maritime occupations	9,095	570
17.2302 Machine shop occupations	100,793	24,345
17.2303 Machine tool operation	12,695	3,263
17.2305 Sheet metal	24,934	4,638
17.2306 Welding and cutting	175,937	40,840
17.2307 Tool and die making	7,084	1,900
17.2399 Other metalworking occupations	123,732	15,326
17.2400 Metallurgy occupations	3,110	308
17.2601 Barbering	3,948	810
17.2602 Cosmetology	74,908	18.309
17.2699 Other personnel services	14,911	1,342
17.2700 Plastics occupations	8,193	906
17.2801 Firefighter training	69,765	8,897
17.2802 Law enforcement training	115,457	13,403
17.2899 Other public services	66,237	4,549
17.2900 Quantity food occupations	48,213	9,233
17.3000 Refrigeration	9,987	2,137
17.3100 Small engine repair	51,627	10,898
17.3200 Stationary energy sources occupations	12,225	2,350
17.3300 Textile production and fabrication	55,078	16,238
17.3400 Leather working	2,129	727
17.3500 Upholstering	21,210	4,336
17.3600 Woodworking occupations	79,134	13,865
17.9900 Other	177,898	41,940
99. Special programs[1]	2,004,858	16,181
99.0100 Group guidance (prevocational)	942,605	0
99.0200 Prepostsecondary	45,620	0
99.0300 Remedial	118,837	0
99.0400 Industrial arts	446,067	127
99.0500 Volunteer firefighter	182,926	16,016
99.0600 Other not elsewhere classified	271,131	38

[1] Unduplicated total.

Source: Summary Data, Vocational Education – Fiscal years 1975 and 1976. (U.S. Dept. of Health, Education, and Welfare, Office of Education, Bureau of Occupational and Adult Education).

Table C-8. Total enrollments and total completing programs in private postsecondary schools with occupational programs, by program: [U.S. total], 1975-76.

[Thousands]

OE instructional code and title		Enrollments	Completed program
Total, private schools		638.5	347.7
01.	Agri-business	2.5	2.0
01.02	Agricultural supplies/services	.1	.1
01.06	Agricultural resources	1.2	1.2
01.0299	Veterinarian assistant	1.2	.7
04.	Marketing and distribution	57.2	44.8
04.01	Advertising services	0	0
04.02	Apparel and accessories	19.0	15.0
04.03	Automotive	.1	.1
04.04	Finance and credit	1.0	.7
04.05	Floristry	0	0
04.06	Food distribution	.5	.5
04.07	Food services	.6	.4
04.08	General merchandise	1.0	.7
04.10	Home furnishing	0	0
04.11	Hotel and lodging	1.3	.7
04.12	Industrial marketing	0	0
04.13	Insurance	1.6	1.4
04.14	International trade	0	0
04.16	Petroleum	0	0
04.17	Real estate	25.2	21.2
04.18	Recreation and tourism	3.9	2.5
04.19	Transportation	1.5	.8
04.20	Retail trade, other	1.1	.6
04.99	Distributive education, other	.4	.2
07.	Health occupations	94.0	48.6
07.0101	Dental laboratory technology	.9	.6
07.0103	Dental assisting	6.4	5.0
07.0199	Dental, other	(1)	(1)
07.0202	Histology	(1)	(1)
07.0203	Medical laboratory assisting	.2	.1
07.0204	Hematology	(1)	(1)
07.0299	Medical laboratory technology, other	4.0	2.3
07.0301	Nursing (associate degree)	2.3	1.0
07.0302	Practical (vocational) nursing	4.7	3.4
07.0303	Nursing assistant (aide)	4.9	4.1
07.0304	Psychiatric aide	0	0
07.0305	Surgical technician	0	0
07.0399	Nursing, other	44.9	14.7
07.0401	Occupational therapy	0	0
07.0402	Physical therapy	.2	(1)
07.0499	Rehabilitation services, other	0	0
07.0501	Radiologic technology	6.1	3.0
07.0503	Nuclear medical technology	.1	(1)
07.06	Ophthalmic	(1)	(1)
07.08	Mental health technology	0	0
07.0902	Electrocardiograph technology	.2	.2
07.0903	Inhalation therapy	0	0
07.0904	Medical assisting (office)	11.0	7.2
07.0906	Community health aide	0	0
07.0907	Medical emergency technician	.1	.1
07.0909	Mortuary science	4.1	3.8
07.0915	Medical records technician	.5	.2
07.0920	Physician's assistant	1.7	1.7
07.99	Health occupations, other	1.7	1.2
09.	Home economics	1.7	.2
09.0202	Clothing management, production, and services	.4	.2
09.0203	Food management, production, and services	1.1	0
09.0205	Institutional and home management and services	.2	(1)
14.	Business and office	204.5	90.9
14.01	Accounting and computing occupations	25.5	12.0
14.0201	Computer operator	4.5	2.6
14.0202	Keypunch operator	11.8	8.4
14.0203	Computer programmer	7.6	3.2
14.0299	Business data processing, NEC.	4.8	2.8
14.03	Filing, office machines, clerical occupations	12.9	8.3
14.04	Information communication occupations	5.1	4.4
14.05	Materials support occupations	0	0
14.07	Steno, secretarial and related occupations	79.7	33.7
14.08	Supervisory and administrative management occupations	35.4	6.4
14.09	Typing and related occupations	11.8	6.9
14.99	Office occupations, other	5.4	2.2
16.	Technical occupations	72.5	38.8
16.0101	Aeronautical technology	.6	.5
16.0102	Agricultural technology	0	0
16.0103	Architectural technology	.2	.1
16.0104	Automotive technology	2.9	1.6
16.0105	Chemical technology	.2	.1
16.0106	Civil technology	.1	(1)
16.0107	Electrical technology	.3	.3
16.0108	Electronic technology	10.6	3.0
16.0109	Electromechanical technology	0	0
16.0110	Environmental control technology	0	0
16.0111	Industrial technology	1.3	.2
16.0112	Instrumentation technology	0	0
16.0113	Mechanical technology	.2	.1
16.0114	Metallurgical technology	(1)	(1)
16.0115	Nuclear technology	0	0
16.0117	Scientific data processing	0	0
16.0203	Legal assistant	1.5	.5
16.0601	Commercial pilot training	32.4	20.6
16.0602	Fire and fire safety technology	0	0
16.0605	Police science technology	0	0
16.0606	Teacher's assistant	0	0
16.0607	Library assistant	(1)	0
16.0608	Communications technology	14.7	8.6
16.0695	Performing artists	7.5	3.2
16.9901	Air pollution technology	(1)	(1)
16.9902	Water and waste water treatment	(1)	(1)

See footnotes at end of table.

Table C-8. Total enrollments and total completing programs in private postsecondary schools with occupational programs, by program: [U.S. total], 1975-76—Continued

OE instructional code and title		Enrollments	Completed program
17.	Trade and industrial	206.1	122.4
17.01	Air conditioning installation and repair	5.8	3.1
17.02	Appliance repair	.6	.5
17.0301	Body and fender repair	1.4	.8
17.0302	Auto mechanic	9.0	3.9
17.0303	Auto specialization, repair	.3	.1
17.0399	Automotive services, other	.9	.3
17.0401	Aircraft maintenance	2.5	1.4
17.0402	Aircraft operations	.9	.6
17.0403	Ground operations	.6	.4
17.05	Blueprint reading	0	0
17.06	Business machine maintenance	1.0	.7
17.07	Commercial art occupations	4.5	3.0
17.08	Commercial fishery occupations	0	0
17.09	Commercial photography occupations	6.1	2.2
17.1001	Carpentry, construction	.3	.2
17.1002	Electricity, construction	.6	.5
17.1003	Heavy equipment maintenance operations	1.9	1.8
17.1004	Masonry	.1	(1)
17.1005	Painting and decorating	0	0
17.1007	Plumbing and pipefitting	.2	.1
17.1008	Drywall installation	0	0
17.1099	Construction and maintenance trades, other	.3	.2
17.11	Custodial services	.1	[1]
17.12	Diesel mechanic	5.3	3.5
17.13	Drafting occupations	5.4	1.9
17.14	Electrical occupations	.2	.1
17.1503	Radio and TV repair	3.2	1.5
17.1599	Electronics occupations, other	5.0	1.8
17.16	Fabric maintenance services	0	0
17.17	Supervisor and management development	0	0
17.19	Graphic arts occupations	2.7	1.2
17.20	Industrial atomic energy occupations	0	0
17.21	Instrument maintenance and repair occupations	.2	(1)
17.22	Maritime occupations	2.1	1.8
17.2302	Machine shop occupations	.5	.3
17.2303	Machine tool operations	0	0
17.2306	Welding and cutting	15.4	9.7
17.2307	Tool and diemaking	.2	(1)
17.2399	Metalworking, other	2.1	1.3
17.24	Metallurgy occupations	.7	.5
17.2601	Barbering	7.9	5.0
17.2602	Cosmetology	89.1	49.4
17.2699	Personal services, other	2.9	2.4
17.27	Plastics occupations	0	0
17.2801	Firefighter training	0	0
17.2802	Law enforcement training	.1	.1
17.2899	Public service occupations, other	.4	.4
17.29	Quantity food occupations	4.6	3.8
17.30	Refrigeration	1.3	.8
17.31	Small engine repair, internal combustion	(1)	(1)
17.33	Textile production and fabrication	2.7	2.6
17.34	Leatherworking	0	0
17.35	Upholstering	.7	.6
17.36	Woodworking occupations	0	0
17.40	Truck driving	10.6	9.7
17.9900	Trade and industrial occupations, other	5.7	4.2

[1] The number was less than 50.

SOURCE: U.S. Department of Health, Education, and Welfare, National Center for Education Statistics.

Appendix D. State Employment Security Agencies

State employment security agencies develop occupational projections and related employment statistics in cooperation with the Bureau of Labor Statistics of the U.S. Department of Labor. The following list gives the addresses of the employment security agencies.

Alabama	Chief, Research and Statistics, Department of Industrial Relations, Industrial Relations Building, 649 Monroe Street, Montgomery 36130.
Alaska	Chief, Research and Analysis, Employment Security Division, Department of Labor, P.O. Box 3-7000, Juneau 99811.
Arizona	Chief, Labor Market Information, Research and Analysis, Department of Economic Security, P.O. Box 6123, Phoenix 85005.
Arkansas	Chief, Research and Statistics, Employment Security Division, P.O. Box 2981, Little Rock 72203.
California	Chief, Employment Data and Research Division, Employment Development Department, 800 Capitol Mall, Sacramento 95814.
Colorado	Chief, Research and Analysis, Division of Employment, Department of Labor and Employment, 251 East 12th Avenue, Denver 80203.
Connecticut	Director, Research and Information, Connecticut Employment Security Division, 200 Folly Brook Boulevard, Weatherfield 06109.
Delaware	Chief, Office of Research, Planning, and Evaluation, Department of Labor, 801 West 14th Street, Wilmington 19899.
District of Columbia	Chief, Division of Manpower Reports and Analysis, Office of Administration and Management Services, D.C. Department of Manpower, 605 G Street, N.W., Washington, D.C. 20001.
Florida	Director, Research and Statistics, Division of Employment Security, Florida Department of Commerce, 17720 South Gadsden Street, Tallahassee 32304.
Georgia	Director, Information Systems, Employment Security Agency, Department of Labor, 254 Washington Street S.W., Atlanta 30334.
Hawaii	Chief, Research and Statistics, Department of Labor and Industrial Relations, 825 Mililani Street, Honolulu 96813.
Idaho	Chief, Research and Analysis, Department of Employment, P.O. Box 35, Boise 83707.
Illinois	Manager, Research and Analysis Division, Bureau of Employment Security, Department of Labor, 910 South Michigan Avenue, Chicago 60605.
Indiana	Chief of Research, Employment Security Division, 10 North Senate Avenue, Indianapolis 46204.
Iowa	Chief, Research and Statistics, Employment Security Division, Department of Labor, 401 Topeka Avenue, Topeka 60603
Kentucky	Director, Research and Special Projects, Department of Human Resources, State Office Building Annex, Frankfort 40601.
Louisiana	Acting Chief, Research and Statistics, Department of Employment Security, P.O. Box 44094, Baton Rouge 70804.
Maine	Director, Manpower Research Division, Employment Security Commission, 20 Union Street, Augusta 04330.
Maryland	Acting Director, Research Analysis, Department of Human Resources, 110 North Eutaw Street, Baltimore 21201.
Massachusetts	Assistant Director, Research and Information Service, Division of Employment Security, Hurley Building, Government Center, Boston 02114.
Michigan	Director, Research and Statistics Division, Employment Security Commission, Department of Labor Building, 7310 Woodward Avenue, Detroit 48202.

Minnesota	Director, Research and Planning, Department of Employment Services, 390 North Robert Street, St. Paul 55101
Mississippi	Chief, Research and Statistics, Employment Security Commission, P.O. Box 1699, Jackson 39205.
Missouri	Chief, Research and Analysis, Division of Employment Security, Department of Labor and Industrial Relations, P.O. Box 59, Jefferson City 65101.
Montana	Chief, Research and Analysis, Employment Security Division, P.O. Box 1728, Helena 59601.
Nebraska	Chief, Research and Statistics, Division of Employment, Department of Labor, P.O. Box 94600, State House Station, Lincoln 68509.
Nevada	Chief, Manpower Information and Research, Employment Security Department, 500 East Third Street, Carson City 89701.
New Hampshire	Supervisor, Economic Analysis and Reports, Department of Employment Security, 32 South Main Street, Concord 03301.
New Jersey	Director, Division of Planning and Research, Department of Labor and Industry, John Fitch Plaza, Trenton 08625.
New Mexico	Chief, Research and Statistics, Employment Security Commission, P.O. Box 1928, Albuquerque 87103.
New York	Director, Division of Research and Statistics, Department of Labor, 2 World Trade Center, New York 10047.
North Carolina	Manager, Bureau of Employment Security Research, Employment Security Commission, P.O. Box 25903, Raleigh 27602.
North Dakota	Chief, Reports and Analysis, Employment Security Bureau, P.O. Box 1537, Bismarck, 58501.
Ohio	Director, Division of Research and Statistics, Bureau of Employment Services, 145 South Front Street, Columbus 43216.
Oklahoma	Chief, Research and Planning Division, Employment Security Commission, Will Rogers Memorial Office Building, Oklahoma City 73105.
Oregon	Chief, Research and Statistics, Employment Division, 875 Union Street N.E., Salem 97310.
Pennsylvania	Assistant Director, Research and Statistics, Bureau of Employment Security, Department of Labor and Industry, 7th and Forster Streets, Harrisburg 17121.
Puerto Rico	Chief of Research and Statistics, Bureau of Employment Security, 427 Barbosa Avenue, Hato Rey 00917.
Rhode Island	Supervisor, Employment Security Research, Department of Employment Security, 24 Mason Street, Providence 02903.
South Carolina	Director, Manpower Research and Analysis, Employment Security Commission, 1550 Gadsden Street, Columbia 29202.
South Dakota	Chief, Research and Statistics, Employment Security Department, 607 North Fourth Street, Box 730, Aberdeen 57401.
Tennessee	Chief, Research and Statistics, Department of Employment Security, 519 Cordell Hull Building, Nashville 37219.
Texas	Chief, Manpower Data Analysis and Research (MDAR), Employment Commission, TEL Building, 15th and Congress Avenue, Austin 78778.
Utah	Director, Reports and Analysis, Department of Employment Security, P.O. Box 11249, Salt Lake City 84111.
Vermont	Chief, Research and Statistics, Department of Employment Security, P.O. Box 488, Montpelier 05602.
Virginia	Chief, Manpower Research, Virginia Employment Commission, P.O. Box 1358, Richmond 23211.
Washington	Chief, Research and Statistics, Employment Security Department, P.O. Box 367, Olympia 98504.
West Virginia	Chief, Research and Statistics, Department of Employment Security, 112 California Avenue, Charleston 25305.
Wisconsin	Director, Research and Statistics, Department of Industry, Labor and Human Relations, P.O. Box 2209, Madison 53701.
Wyoming	Chief, Research and Analysis, Employment Security Commission, P.O. Box 2760, Casper 82601.

Appendix E. Bibliography

This appendix includes additional sources of occupational information. The publications listed under each subject heading are intended to provide a representative sample of the wealth of information available.

General information

U.S. Department of Commerce, Bureau of the Census. Census of Population: 1970 Subject Reports, Final Report PC(2)-7A, Occupational Characteristics, 1973.

Employment and unemployment data for detailed occupations by color, sex, class of worker, earnings, and a variety of other characteristics. Data for earlier censuses are available in publications of the same title for the appropriate census years.

U.S. Department of Labor, Bureau of Labor Statistics. *Handbook of Labor Statistics,* Bulletin 1966, 1977.

Compilation of major statistical series on employment, unemployment, wages, and other subjects produced by the Bureau of Labor Statistics. Also includes related series from other governmental agencies and foreign countries. Contains 160 tables which generally begin with 1967 data and run through 1976. Annual.

U.S. Department of Labor, Bureau of Labor Statistics. *BLS Handbook of Methods for Surveys and Studies,* Bulletin 1910, 1976.

Described each BLS statistical program, noting the origin of data, defining terms, and outlining concepts. Tables, survey forms, and mathematical formulations are presented for clarification. Sources of additional information also are included.

U.S. Department of Labor, Bureau of Labor Statistics. *U.S. Working Women: A Databook,* Bulletin 1977, 1977.

Statistical report on the changing role of women in the labor force. Brief text gives highlights of tables and charts on labor force participation of women, employment and unemployment, marital status, income, education, job tenure, work life expectancy, and other social and demographic characteristics.

U.S. Department of Labor and U.S. Department of Health, Education, and Welfare. *Employment and Training Report of the President,* 1977. Annual since 1963 under *Manpower Report of the President.*

Includes the Department of Labor's annual report on employment and training requirements, resources and utilization, and employment and training programs. Statistical appendix presents data on the labor force, employment, and education as well as projections relevant to these areas.

U.S. Department of Labor, Employment and Training Administration. *Research and Developments Projects.* Annual.

Lists completed research and development projects funded by the Employment and Training Administrations, with annotations.

Education and training information

Lusterman, Seymour. *Education in Industry,* Report 719. New York, The Conference Board, Inc., 1977.

A study of the aims, scope, and character of employee education and training activities among corporations with 500 or more employees. Sections are included on corporate employee education and training activities, industry's use of outside resources for employee development, internal programs conducted during working hours, and case illustrations of individual company programs.

Neary, H. James. "The BLS Pilot Survey of Training In Industry." *Monthly Labor Review,* February 1974, pp. 26-32.

Describes the results of the BLS pilot survey of training in metalworking industries, including methods of data collection and the survey design. The pilot survey was conducted to determine whether reliable data could be collected on training enrollments and completions in industry.

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Renetzky, Alvin, and Gail A. Schlachter, editors. *Directory of Internships, Work Experience Programs, and On-the-Job Training Opportunities.* Thousand Oaks, California, Reddy Reference Press, 1976.

A guide to internship, work experience, and on-the-job training opportunities sponsored by governmental agencies, business and industry, professional associations, foundations, and various social and community organizations.

U.S. Department of Health, Education, and Welfare, National Institute of Education. *Home-Based Education: Needs and Technological Opportunities,* 1976.

Reviews literature on correspondence education and a Stanford University research project on computer-assisted instruction at home. A cross-referenced annotated bibliography covering the home-based instructional uses of computers, television, and other media also is included.

U.S. Department of Health, Education, and Welfare, Office of Education, National Center for Education Statistics. *The Condition of Education.* Annual since 1975.

A statistical report that examines differences in educational opportunities, participation, and outcomes among groups of individuals according to sex, ethnic origin, family income, and other characteristics.

U.S. Department of Health, Education, and Welfare, Office of Education, National Center for Education Statistics. *Digest of Educational Statistics.* Annual since 1962.

Contains data on enrollments, degrees, and other items. Compiled from various sources indicated in table footnotes.

U.S. Department of Health, Education, and Welfare, Office of Education, National Center for Education Statistics. *Directory of Postsecondary Schools with Occupational Programs, 1971.* DHEW Publication No. (OE)73–11410, 1973.

A comprehensive list of all schools offering postsecondary occupational training, including private vocational schools as well as 2- and 4-year colleges.

U.S. Department of Health, Education, and Welfare, Office of Education, National Center for Education Statistics. *Enrollment in Vocational Education Occupation Programs* Vocational Education Information No. 11. Annual since fiscal year 1966.

Contains enrollments by detailed occupational program for fiscal years.

U.S. Department of Health, Education, and Welfare, Office of Education, National Center for Education Statistics. *Projections of Educational Statistics.* Annual since 1964.

Lists projections of enrollments, graduates, faculty, and expenditures for higher education, as well as similar projections for elementary and secondary schools.

U.S. Department of Labor, Bureau of Labor Statistics and Employment and Training Administration. *Occupational Training in Selected Metalworking Industries: A Report on a Survey of Selected Occupations, 1974,* BLS Bulletin 1976/ETA R&D Monograph 53, 1977.

The results of a nationwide survey of employer training in nearly 5,000 establishments conducted in 1975 and early 1976. Describes the characteristics of occupational training provided by employers for 14 selected occupations in four metalworking industries.

U.S. Department of Labor, Bureau of Labor Statistics. *Tomorrow's Manpower Needs.* Bulletin 1606, Supplement 3 (Revised). 1975.

Contains conversion tables for matching occupational classifications of BLS projections to vocational education program codes. Based on 1970 census.

U.S. Department of Labor, Employment and Training Administration. *Screening and Admissions Guide for Job Corps Under the Comprehensive Employment and Training Act of 1973,* 1976.

Provides guidelines on the screening and admissions process and procedures to be followed when recommending and processing youth for enrollment in the Job Corps programs under CETA.

Wenrich, Ralph C., and J. William Wenrick. *Leadership in Administration of Vocational and Technical Education.* Columbus, Ohio, Merrill Publishing Co., 1974.

Analyzes changes in vocational education and suggests ways in which a program administrator might use this information in planning programs designed to prepare youth and adults for employment.

Followup data

Astin, Alexander. *The College Drop Out: A National Profile.* Washington, D.C., American Council on Education, 1972.

Examines what happens to college dropouts, their entry into the labor force, transfer rates, and likelihood of return to college.

Astin, Helen, and Ann S. Bisconti. *Career Plans of College Graduates of 1965 and 1970.* Bethlehem, Pa., College Placement Council, Inc., 1972.

Reports on entry to employment by type of employer, undergraduate major, occupation, and other items. Based on data from the American Council on Education.

Astin, Helen, and Ann S. Bisconti. *Undergraduate and Graduate Study in Scientific Fields.* Washington, D.C., American Council on Education, ACE Research Reports, Vol. 8, No. 3, August 1973.

Examines the flow of a national cohort of college freshmen of 1961 over a decade, focusing on patterns of undergraduate study, attrition, degree attainment, advanced study, and employment. Findings on the progress and goals of 1966 freshmen are included as a means of comparison with the 1961 cohort. Contains 78 separate cross-tabulations.

Astin, Helen, Elaine El-Khawas, and Ann S. Bisconti. *Beyond the College Years.* Washington, D.C., American Council on Education, 1974.

Report prepared for the National Science Foundation and the National Institutes of Health. Uses correlation and regression analysis to examine factors associated with career outcomes and presents data on career flows.

Bayer, Alan, Jeannie Royer, and Richard Webb. *Four Years After College Entry.* Washington, D.C., American Council on Education, ACE Research Reports, Vol. 8, No. 1, 1973.

Followup of a sample of the freshman class of 1967.

College Placement Council, Inc. *The College Graduate: Turnover and Mobility,* Report No. 3, Bethlehem, Pa., 1970.

Using National Opinion Research Center data for 33,000 graduates of the class of 1961, the report studies labor force mobility and job changing during 5 years after graduation. Detail includes degree field, type of employer, and sex. Earlier reports in the series dealt with graduates' attitudes toward business, and job satisfaction.

College Placement Council, Inc. *College Graduates and Their Employers – A National Study of Career Plans and Their Outcomes,* Report No. 4. 1975.

Actual occupations of college graduates compared with college-year plans. Analyses flow directly from *Career Plans of College Graduates of 1965 and 1970* (see above), but provide greater detail in classification of majors and careers.

College Placement Council, Inc. *The Hard-to-Place Majority – A National Study of the Career Outcomes of Liberal Arts Graduates,* Report No. 5. 1975.

Actual occupations of college graduates compared with field of study. Analyses flow directly from *Career Plans of College Graduates of 1965 and 1970* (see above), with emphasis on liberal arts graduates.

College Placement Council, Inc., *Four-Year Liberal Arts Graduates: Their Utilization in Business, Industry, and Government – The Problem and Some Solutions. 1975.*

A position statement covering the dilemma facing liberal arts graduates, dimensions of the dilemma, new directions, areas in which action is needed, and conclusions.

College Placement Council, Inc., *Job Satisfaction After College. . .The Graduate's Viewpoint,* 1977.

Followup study of people who were freshmen in 1961, whose highest degree held was a bachelor's degree, and who were working full time.

Duis, Harold. "Employment of Vocational Program Graduates," *American Education,* February 1968.

Provides data on entrance rates of graduates from vocational training programs into different occupational classifications.

El-Khawas, Elaine, and Ann S. Bisconti. *Five and Ten Years After College Entry.* Washington, D.C., American Council on Education, ACE Research Reports, Vol. 9, No. 1, 1974.

Descriptive report including 1971 data on college freshmen of 1961 and 1966.

Engineering Manpower Commission. *Engineering and Technology Graduates.* New York, Engineers Joint Council. Annual.

Survey of 2-year associate degrees granted for completion of engineering and technology curriculums.

Engineering Manpower Commission. *Placement of Engineering Graduates.* New York, Engineers Joint Council. Annual.

Data from a survey of over 200 engineering schools provide information on the placement status of 24,000 technical and 14,500 nontechnical graduates who received bachelor's degrees. Numbers and percentages of graduates entering employment, graduate school, and military service are given.

National Research Council, National Academy of Sciences. *Careers of Ph.D.'s – Academic Versus Non-Academic –*

A Second Report on Follow-up of Doctorate Cohorts 1935-1960. Career Patterns Report No. 2, Publication 1577, 1968.

By studying the careers of 10,000 holders of third-level research degrees, systematically selected from the graduating classes of 1935, 1940, 1950, 1955, and 1960, this report focuses on the factors associated with choice of employment in academic or other settings, with particular emphasis on the circumstances surrounding a change in employer category.

Project Talent – One Year Follow-up Studies. Pittsburgh, University of Pittsburgh, School of Education, 1966.

From an original study in 1966 of a 5-percent sample of high school students (440,000) in 1,353 schools, the report compiles information on each group 1 year after graduation. It studies the nature of their employment and job satisfaction, the nature and extent of their post-high school education, and long range career plans.

Project Talent – A 5-year Follow-up Information on High School Graduates of 1960. Pittsburgh, University of Pittsburgh, School of Education, July 1969.

A continuing followup of the high school graduates, their activities during the 5 years after graduation, examining employment and continuing education.

Sharp, Laure M., and Albert D. Biderman. *Employment of Retired Military Personnel. BSSR 361. Washington, D.C.*, Bureau of Social Science Research, 1966.

A detailed study of the employment practices of those leaving the military. Occupational information is given by age, race, and rank. Excerpts are published in the *Monthly Labor Review*, January and February, 1967.

Sharp, Laure M., et. al. *Five Years After the College Degree.* Washington, D.C., Bureau of Social Science Research, 5 volumes:

Part I: *Graduate and Professional Education.* 1965.
Part II: *Occupational Outcome* (Text Tables: Appendix Tables). 1965.
Part III: *Methodological Note.* 1966.
Part IV: *Military Service.* 1967.
Part V: *Geographic Mobility.* 1967.

Based on a survey in 1963 of 1958 bachelor's degree recipients including a subsample of individuals surveyed in the National Science Foundation study, *Two Years After the College Degree,* who obtained further graduate and professional education during 1958-63. Describes occupational entry and other characteristics by type of training.

Somers, Gerald G. *The Effectiveness of Vocational and Technical Programs: A National Follow-up Study.* Madison, University of Wisconsin, Center for Studies in Vocational and Technical Education, 1971.

Based on a 1969 survey of a national sample of 1966 vocational and technical program graduates, reports labor force and employment status by type of program, major occupational classification, and personal characteristics.

U.S. Department of Health, Education, and Welfare, National Center for Educational Statistics, Office of Education. *National Longitudinal Study of the High School Class of 1972, Comparative Profiles – One and One-Half Years after Graduation.* DHEW Publication No. (NCES) 76-220, 1975.

A continuing followup study of a sample of 20,000 high school seniors of 1972 to examine their postsecondary educational and occupational status, and its relation to high school training experience.

Occupational mobility

Byrne, James J. "Occupational Mobility of Workers," *Monthly Labor Review*, February 1975, pp. 53-59.

Discusses occupational mobility of workers between January 1972 and January 1973 by age, sex, and race, and compares results of postcensal survey to those of a similar survey in 1965.

Parnes, Herbert S. "Longitudinal Surveys: Prospects and Problems," *Monthly Labor Review,* February 1972, pp. 11-15.

Discusses the surveys and lists additional articles and reports based on survey data.

Sharp, Laure M., et. al. Five Years After the College Degree. Washington, D.C., Bureau of Social Science Research, 5 volumes: Part V: *Geographic Mobility, 1967.*

Based on a survey in 1963 of 1958 bachelor's degree recipients including a subsample of individuals surveyed in the National Science Foundation study, *Two Years After the College Degree,* who obtained further graduate and professional education during 1958-63.

Sommers, Dixie, and Alan Eck, "Occupational Mobility in the American Labor Force", *Monthly Labor Review* January, 1977, pp. 3-19.

Provides data on occupational mobility revealed by the 1970 Census of Population. It discusses the uses of mobility information, the patterns of separation and entry, and the limitations on the data.

U.S. Department of Commerce, Bureau of the Census, Census of Population: 1960, Subject Reports, Final Report PC(2)-2B, *Mobility for States and State Economic Areas*, 1963.

Contains data on economic, demographic, and social characteristics, including major occupational groups, of the population classified by mobility status.

U.S. Department of Commerce, Bureau of the Census, Census of Population: 1970, Subject Reports, Final Report PC(2)-7E, *Occupation and Residence in 1965*, 1973.

Geographic mobility data for major occupational groups, comparable 1960 data are in Final Report PC(2)-2B, *Mobility for States and State Economic Areas*.

U.S. Department of Labor, Bureau of Labor Statistics. *Occupational Mobility of Workers*, Special Labor Force Report 176, 1975.

Discusses patterns of mobility, demographic characteristics, flows among occupations, and job and industrial mobility.

Immigration

National Science Foundation. *Immigrant Scientists and Engineers in the United States. A Study of Characteristics and Attitudes.* NSF 73-302, 1973.

Reports on a survey conducted by NSF in mid-1970 of a sample of those admitted between February 1964 and January 1969 and who filed address reports with the Immigration and Naturalization Service in 1969.

U.S. Department of Health, Education, and Welfare, National Institutes of Health. *The Foreign Medical Graduate: A Bibliography*, DHEW Publication No. (NIH) 73-440, November 1972.

Citations of information about foreign medical graduates in the United States, including their education abroad, flow into the United States, and their training and employment in the United States. Includes only publications before September 1972.

U.S. Department of Labor, Employment and Training Administration. *Immigrants and the American Labor Market*, Manpower Research Monograph 31, 1974.

Discusses the behavior of immigrants in the labor market, the skills they bring with them, skills being used, and their adjustment to the labor market.

Labor force entrants

American Nurses Association. *The Nation's Nurses: Inventory of Registered Professional Nurses.* 1965.

Data on work activity and labor force mobility characteristics of R.N.'s.

National Education Association. *Status of the American Public School Teacher, 1980-71.* Research Report 1972-R3, 1972.

Data on reentrants.

Ornstein, Michael. *Entry into the American Labor Force.* New York, Academic Press. Inc., 1976.

A detailed examination of the way in which a sample of American men entered the labor force. Discusses trends and social mobility after entry.

U.S. Department of Commerce, Bureau of the Census. Census of Population: 1970, Subject Reports, Final Report PC(2)-6C, *Persons Not Employed*, 1973.

Data on occupational characteristics of persons not in the labor force or unemployed. Comparable 1960 data in Final Report PC(2)-6C, *Labor Reserve*.

Separations from the labor force

Fullerton, Howard N. "A New Type of Working Life Table for Men," *Monthly Labor Review*, July 1972, pp. 20-27.

Uses a "generation" life table in which the life spans of cohorts are followed through time, instead of a "period" life table based on mortality rates applicable to each age observed at one point in time. Includes tables, data sources, and technical appendix.

U.S. Department of Labor, Bureau of Labor Statistics, *Length of Working Life for Men and Women, 1970*, Special Labor Force Report 187, 1976.

Discusses worklife expectancies for men and women. The working life table and its uses are explained in the technical appendix.

U.S. Department of Labor, Bureau of Labor Statistics. *Tomorrow's Manpower Needs*, Bulletin 1606, Vol. 1, February 1969, and Supplement 4, *Estimating Occupational Separations from the Labor Force for States*, 1974.

Vol. 1 discusses the development of death and separation rates, and shows 1960 rates for individual occupations by sex in appendix A. Supplement 4 contains estimates of occupational separations for

States and shows 1970 and 1985 rates for individual occupations by sex in appendix B.

Earnings

American Society for Personnel Administration. *Trends in Employment of College and University Graduates in Business and Industry*. Annual since 1946.

Survey of beginning monthly salaries in 185 companies representing large- and medium-sized firms in 22 States and 20 industries. Salaries are for bachelor's and master's degree holders in engineering, accounting, sales, business administration, liberal arts, production management, physics, chemistry, mathematics, economics, and other fields.

College Placement Council, Inc., *College Placement Council Salary Survey*. Issued three times each year.

Reports beginning salary data based on offers made to graduating students at all degree levels in selected curricula and graduate programs.

Endicott, Frank S. *Trends in Employment of College and University Graduates in Business and Industry*. American Society for Personnel Administration. Annual since 1946.

Survey of beginning monthly salaries in 185 companies representing large- and medium-sized firms in 22 States and 20 industries. Salaries are for bachelor's and master's degree holders in engineering, accounting, sales, business administration, liberal arts, production management, physics, chemistry, mathematics, economics, and other fields.

Professional and business associations. The following associations or periodicals conduct salary surveys for occupations of special interest to them:

Advertising Age (magazine)
American Anthropology Association
American Association of Colleges of Pharmacy
American Chemical Society
American Collectors Association, Inc.
American Dental Assistants Association
American Dental Association
American Dental Hygienists Association
American Dietetic Association
American Economic Association
American Institute for Design and Drafting
American Institute of Physics
American Marketing Association
American Mathematical Society
American Petroleum Institute
American Political Science Association
American Psychological Association
American Society of Interior Designers
American Society of Landscape Architects
American Society of Radiologic Technologists
Child Welfare League of America
Engineers Joint Council
Industrial Designers Society of America
Institute of Food Technologists
International City Management Association
International Personnel Management Association
International Taxicab Association
Medical Economics (magazine)
National Academy of Sciences
National Association of Realtors
National Executive Housekeepers Association
National Farm and Power Equipment Dealers Association
PR Reporter (public relations newsletter)
Society of American Foresters
University of Texas Medical Branch (Galveston)

U.S. Department of Labor, Bureau of Labor Statistics. *Area Wage Surveys: Metropolitan Areas, United States and Regional Summaries*. Annual.

Provides national and regional estimates of occupational earnings, supplementary wage benefits, and establishment practices for workers in the Nation's Standard Metropolitan Statistical Areas. Six industry divisions are covered: Manufacturing; transporation, communication, and other public utilities; wholesale trade; retail trade; finance, insurance, and real estate; and selected services.

U.S. Department of Labor, Bureau of Labor Statistics. *Directory of Occupational Wage Surveys, January 1970 - December 1976*, Report 506, 1977.

Lists publications resulting from the Bureau of Labor Statistics' occupational wage programs between 1970 and 1976.

U.S. Department of Labor, Bureau of Labor Statistics. *Employment and Earnings, State and Areas, 1939-75*, Bulletin 1370-12, 1977.

This bulletin is a comprehensive historical reference volume of State and area employment and earnings statistics released by the Bureau of Labor Statistics.

U.S. Department of Labor, Bureau of Labor Statistics. *Employment and Earnings, United States 1909-75*, Bulletin 1312-10, 1976.

Presents historical national earnings data released by the Bureau of Labor Statistics for individual nonagricultural industries.

U.S. Department of Labor, Bureau of Labor Statistics. *National Survey of Professional, Administrative, Technical, and Clerical Pay*. Annual since Winter 1959-60, various bulletins.

Summarizes the results of the Bureau of Labor Statistics' annual salary survey of selected professional, administrative, technical, and clerical occupations in private industry. Averages are shown for annual, monthly, and weekly rates, excluding overtime pay.

Periodicals

U.S. Department of Labor, Bureau of Labor Statistics. *Employment and Earnings*, monthly.

Presents charts and detailed tables on the labor force, employment, unemployment, hours, earnings, and labor turnover. Compiled from data based on household interviews, nonagricultural establishment records, and administrative records of unemployment insurance systems. March issue contains annual averages for previous year for all national industry series.

U.S. Department of Labor, Employment and Training Administration. *Worklife*, monthly.

Presents articles on a wide variety of labor-related topics – jobs, poverty, employment and unemployment, transportation, education, housing, training, upgrading, and apprenticeship.

U.S. Department of Labor, Bureau of Labor Statistics. *Monthly Labor Review*.

Presents articles on employment, labor force, wages, prices, productivity, unit labor costs, collective bargaining, workers' satisfaction, social indicators, and labor developments abroad. Regular features include a review of developments in industrial relations, significant court decisions in labor cases, book reviews, and current labor statistics.

U.S. Department of Labor, Bureau of Labor Statistics. *Occupational Outlook Quarterly*.

Presents current information on employment trends and outlook, supplementing and updating information in the *Occupational Outlook Handbook*.

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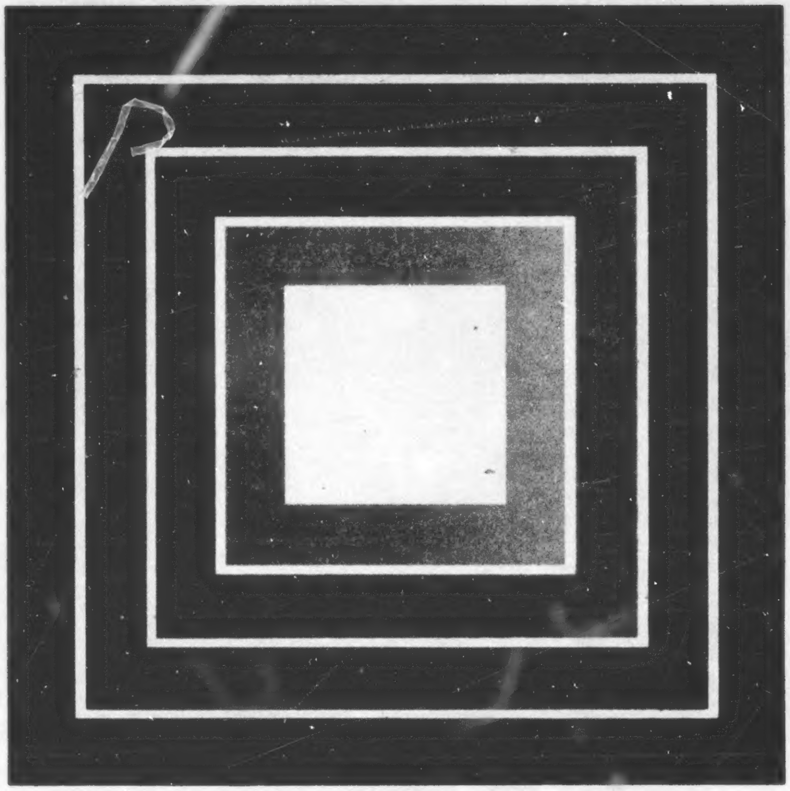

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- Steel Foundries
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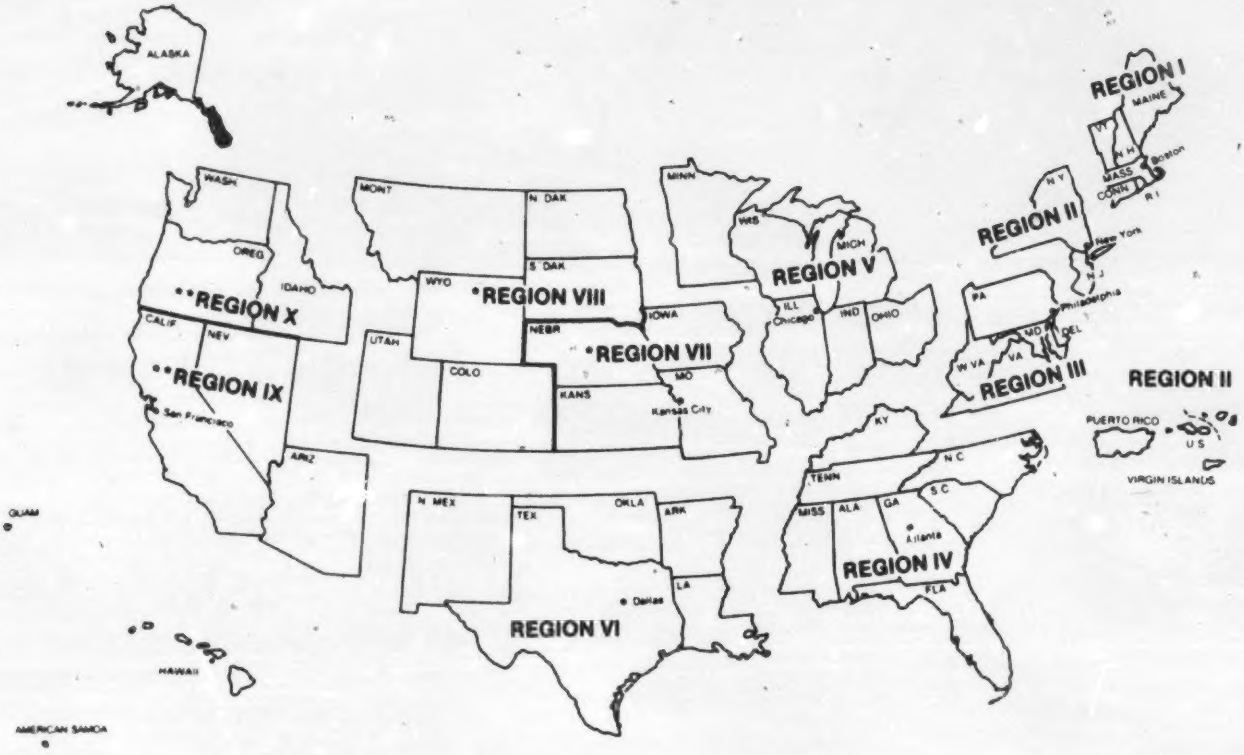
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